

PSEUDOSCORPIONS FROM THE KRAKATAU ISLANDS AND ADJACENT  
REGIONS, INDONESIA  
(CHELICERATA: PSEUDOSCORPIONIDA)

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**Abstract**

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Eighteen pseudoscorpion species are recorded from Krakatau islands and adjacent regions: *Tyrannochthonius krakatau* sp. nov., *T. bagus* sp. nov., *Lagynochthonius kapi* sp. nov., *L. johni* (Redikorzev), *L. thorntoni* sp. nov., *L. hamatus* sp. nov. (Chthoniidae), *Garypus maldivensis* Pocock (Garypidae), *Geogarypus javanus* (Tullgren), *G. albus* Beier (Geogarypidae), *Amblyolpium bellum* Chamberlin, *Beierolpium oceanicum* (With) (Olpiidae), *Metawithius yurii* (Redikorzev) (Withiidae), *Paratemnus assimilis* Beier (Atemnidae), *Haplochernes warburgi* (Tullgren), *H. kraepelini* (Tullgren), *Allochernes liwa* sp. nov., *Verrucachernes oca* Chamberlin, and *Smeringochernes* sp. (Chernetidae). All species except the last are fully described. The following synonymies are proposed: *Geogarypus formosanus* Beier, *G. andyi* Beier and *G. javanus takensis* Beier with *G. javanus* (Tullgren); *Xenolpium oceanicum palauense* Beier, *X. oceanicum rednetum* Beier and *X. oceanicum latum* Beier with *Beierolpium oceanicum* (With); and *Microchernes orientalis* Beier and *M. insularis* Beier with *Verrucachernes oca* Chamberlin. Their biogeography and ecology are discussed. *Oratemnus proximus* Beier (Atemnidae) is recorded from Java for the first time, based on a specimen included in the type series of *Haplochernes kraepelini*.

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### Introduction

The Krakatau Islands lie midway between Java and Sumatra in the Sunda Strait and have attracted considerable attention due to the enormous eruption of 1883 which has been documented by many authors (see Thornton and Rosengren, in press). This eruption eliminated all living matter on the islands, yet within a short space of time, plants and animals had established themselves on the three islands then present, Rakata, Panjang and Sertung; the fourth island, Anak Krakatau, emerged from the sea in 1930 and presently contains the active cone of the volcano.

The first pseudoscorpions to be recorded from the Krakatau Islands were collected by E. Jacobson in May 1908 and identified by Tullgren (1912) as *Chelifer birmanicus* Thorell. As shown below, the material was misidentified and the material actually pertains to *Paratemmus assimilis* Beier. The next collection to be made was by Bristowe (1931) who recorded two species on "Lang Eiland" (Panjang); these specimens have not been available for study. Dammernan (1948) reported the presence of pseudoscorpions on the islands. These specimens were apparently sent to J. C. Chamberlin but have not been available for the present study. Pseudoscorpions were reported from Panjang and Anak Krakatau by Oey et al. (1984) but were not identified any further.

Thus, the 146 specimens collected on the islands by me and others during the 1984 La Trobe Krakatau Expedition, plus further material (28 specimens) collected in the 1985 trip constitute the largest collection to be obtained from the islands. This is not particularly surprising considering the duration and completeness of the La Trobe expeditions (Thornton and Rosengren, in press). In addition, work undertaken at Liwa, Sumatra, and Ujung Kulon and Carita, Java during the 1984 trip yielded a further 86 specimens. All of this material (a total of 260 specimens) is treated in this paper.

Eleven species were collected on the Krakatau islands. All were taken from Rakata, and some were found on the other islands. Seven other species were collected at one or more of the other 1984 study sites, Ujung Kulon, Java, and Liwa, Sumatra.

### Materials and methods

Specimens were borrowed from or have been lodged in the following institutions:

- ANIC, Australian National Insect Collection, Division of Entomology, Canberra, Australia;
- BMNH, British Museum (Natural History), London, England;
- BPBM, Bernice P. Bishop Museum, Honolulu, U.S.A.;
- FMNH, Field Museum of Natural History, Chicago, U.S.A.;
- ICC, J.C. Chamberlin collection, Pacific University, Forest Grove, Oregon, U.S.A.;
- MZB, Museum Zoologicum Bogoriense, Bogor, Indonesia;
- NHMB, Natural History Museum Basel, Switzerland;
- NHMW, Naturhistorisches Museum, Wien, Austria;
- NMV, Museum of Victoria, Melbourne, Australia;
- RMNH, Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands;
- SME, Natur-Museum Senckenberg, Frankfurt-am-Main, Federal Republic of Germany;
- USNM, United States National Museum, Washington, D.C., U.S.A.;
- UZM, Universitets Kobenhavn, Denmark;
- ZI, Academy of Sciences, Leningrad, U.S.S.R.;
- ZMB, Museum fur Naturkunde an der Universitat Humboldt zu Berlin, Democratic Republic of Germany;
- ZMH, Zoologisches Museum fur Hamburg, Federal Republic of Germany.

Unless otherwise stated, the type material of described species has been examined.

The litter dwelling specimens were extracted from sieved litter placed in Winkler traps for 2-4 days. Other specimens were collected by searching directly under the bark of decortivating trees, under the bark of rotting logs or under rocks. The study sites have been described by Thornton and Rosengren (in press). All specimens were initially preserved in 70% ethanol and most were mounted on microscope slides in Euparal following the technique of Hoff (1949); specimens preserved in the

former manner are denoted SP, and those in the latter manner are denoted SL. All specimens were given individual numbers (e.g., MH827.01) as explained in Harvey (1985). Measurements were taken in accordance with Harvey (1987), and where they are presented as a fraction, the numerator refers to the length of the structure and the denominator to its width. Terminology generally follows Chamberlin (1931), except for that of the genitalia which follows Legg (1974, 1975) and is summarised below, the cheliceral setae which follows Harvey (1987), and TS which refers to the distance of the tactile seta from the proximal end of the tarsus of leg IV divided by the length of the tarsus. The carapaceal formulae for the chthoniids follows the format of Gabbutt and Vachon (1963).

#### Genitalic abbreviations

aa, anterior apodeme;  
 apdg, atrium of posterior dorsal gland;  
 ca, chitinised arch;  
 da, dorsal apodeme;  
 dag, dorsal anterior gland;  
 dmgs, duct of median genital sac;  
 ejc, ejaculatory canal;  
 ejca, ejaculatory canal atrium;  
 la, lateral apodeme;  
 lr, lateral rod;  
 mgs, median genital sac;  
 pv, posterior diverticulum of ventral diverticulum;  
 pvdv, posterior ventral diverticulum;  
 trmdv, thickened roof of median diverticulum.

#### Biogeography and ecology

The distribution of each of the species collected during the 1984 and 1985 expeditions is shown in Table 1 and is discussed in more detail below.

1. *Tyrannochthonius krakatau*. This species has so far only been collected in litter on the summit of Rakata and at Ujung Kulon, Java.

2. *Tyrannochthonius bagus*. This species has only been found in litter at Liwa, Sumatra.

3. *Lagynochthonius kapi*. This species is widespread on the Krakatau Islands, but has not yet been located elsewhere. On Rakata it has been collected at Zwarte Hoek and at the summit. It has been taken from rainforest and *Casuarina equisetifolia* J.R. & G. Forst. litter and taken from the underside of rocks on Anak Krakatau.

4. *Lagynochthonius johni*. This species has been recorded from east-central Sumatra and Negros

Island, Philippines, and the present record from Ujung Kulon extends its distribution to Java.

5. *Lagynochthonius thorntoni*. This species has been collected only once under the bark of a log on the beach at Ujung Kulon, Java.

6. *Lagynochthonius hamatus*. This species has only been collected in rainforest litter at Liwa, Sumatra.

7. *Garypus maldivensis*. Previously reported from the Maldive Islands and Sri Lanka, this species, like other members of the genus, is a supralittoral form that is probably distributed along the shoreline in drifting plant material as described by Lee (1979) for *G. californicus* Banks. *Garypus maldivensis* was found only once on the islands at Zwarte Hoek under the bark of a dead *Barringtonia asiatica* (L.) Kurz on the beach.

8. *Geogarypus javanus*. This species is widely distributed in southeast Asia (Thailand, Malaysia, Taiwan, Papua New Guinea, Indonesia, Solomon Islands, and various island groups in Micronesia). It is most commonly found in litter, but has been taken by beating vegetation on Krakatau and Ujung Kulon, Java.

9. *Geogarypus albus*. The only previous collection is that of the type material collected from Malaysia. All of this material was taken from birds' nests, but the specimen collected from Ujung Kulon was taken from litter.

10. *Amblyolpium bellum*. Until now, the only known collection sites of this species were Kepulauan Banda, Maluku and Tjibodas, Java. On Krakatau, it has been collected from Rakata and Panjang, under the bark of trees including *Ficus* sp. and *Timonium compressicaulis* (Miq.) Boerl.

11. *Beierolpium oceanicum*. This is a widespread species and has been collected from Krakatau to Samoa.

12. *Metawithius yurii*. This species has previously been collected only at the type localities in Cambodia (Kampuchea) and Vietnam. On the Krakataus, it has only been collected from Rakata and Sertung. All specimens except one from Sertung, which was collected under bark of a dead *Ficus* sp. on the beach, were taken by beating vegetation in rainforest.

13. *Paratemnus assimilis*. This species was originally described from the Philippines and was collected by the La Trobe expeditions near Carita, Java from under the bark of a dead tree in secondary rainforest, and on Rakata by beating vegetation, in litter and from the inside of a tent.

Table 1. Collection sites of each of the species collected during the 1984 and 1985 expeditions (abbreviations: L, Liwa; R, Rakata; A, Anak Krakatau; P, Panjang; S, Sertung; C, Carita; U, Ujung Kulon).

	I.	R	A	P	S	C	U
Chthoniidae							
<i>Tyrannochthonius krakatau</i> sp. nov.		x					x
<i>Tyrannochthonius bagus</i> sp. nov.	x						
<i>Lagynochthonius kapi</i> sp. nov.		x	x	x	x		
<i>Lagynochthonius johni</i> (Redikorzev)							x
<i>Lagynochthonius thorntoni</i> sp. nov.							x
<i>Lagynochthonius hamatus</i> sp. nov.	x						
Garypidae							
<i>Garypus maldivensis</i> Pocock		x					
Geogarypidae							
<i>Geogarypus javanus</i> (Tullgren)		x					x
<i>Geogarypus albus</i> Beier							x
Olpidae							
<i>Amblyolpium bellum</i> Chamberlin		x		x			
<i>Beierolpium oceanicum</i> (With)		x	x		x		
Withiidae							
<i>Metawithius yurii</i> (Redikorzev)		x			x		
Atemnidae							
<i>Paratemnus assimilis</i> Beier		x				x	
Chernetidae							
<i>Haplochernes warburgi</i> (Tullgren)		x			x		
<i>Haplochernes kraepelini</i> (Tullgren)		x				x	
<i>Allochernes liwa</i> sp. nov.	x						
<i>Verrucachernes oca</i> Chamberlin		x		x	x		
<i>Smeringochernes</i> sp.							x

14. *Haplochernes warburgi*. This species was originally described from Java, but has since been reported from Sulawesi, Papua New Guinea and Sri Lanka. It is one of the most common pseudoscorpion species on Krakatau and has so far been collected on all of the islands except Anak Krakatau. It was most commonly collected by beating or sweeping vegetation, and was often found within the campsite. It was observed moving around inside tents and on structures during the day and appears to be at least partially diurnal. There is every likelihood that this species may be moved from island to island by human activity.

15. *Haplochernes kraepelini*. This species has been collected in Java and the Palau and Caroline Islands in Micronesia. The material collected by the La Trobe expeditions was taken under bark of trees (Carita, Java) or by beating (Rakata). It was not

found on any of the Krakatau islands except Rakata.

16. *Allochernes liwa*. This species has only been taken at Liwa, Sumatra by beating vegetation.

17. *Verrucachernes oca*. This species is very widely distributed in south-east Asia from Vietnam to the Solomon Islands. It was collected on all of the Krakatau islands except Anak Krakatau, under the bark of logs or dead trees.

Bush and Whittaker (1986) divided the flora of the islands into three main types, two of which were further divided. The "coastal zone" includes the "*Casuarina* communities", "*Barringtonia* communities" and the "*Pes-caprae* formation". The "lowland forest" includes six forest types, each characterised by a different tree species or group of species. The "montane forest", found only on the summit of Rakata, is rich in *Schefflera poly-*

*botrya* (Miq.) Vig. The eleven pseudoscorpion species collected on the Krakataus may be readily classified with reference to these three groups (Table 2). Further classification into the six lowland groups is not possible due to the combined effect of the lack of suitable data collected on the tree formations during the collection of the animals, and the apparent widespread distribution of most of the pseudoscorpions in the lowland formations. A further zone is recognised in the "coastal zone" for the purposes of this discussion, the "littoral zone".

(1) Coastal zone. The littoral zone contained two pseudoscorpion species, *Garypus maldivensis* and *Beierolpium oceanicum*, both of which were collected under the bark of dead trees on the beach at Rakata. Two other species, *Verrucachernes oca* and *Metawithius yurii*, were collected from under the bark of a dead *Ficus* sp. overhanging the beach at Sertung, but I have my doubts that the branch was truly affected by waves. The tree was in an area where the lowland forest came right down to the beach, and these two species may simply be incur-sive elements in the coastal zone.

*Lagynochthonius kapi* and *B. oceanicum* were commonly found in the *Casuarina equisetifolia* litter, while *Geogarypus javanus* and *Haplochernes warburgi* were found on the spit at Sertung.

(2) Lowland zone. The lowland pseudoscorpion fauna was the most diverse, which is consistent with the floral analysis of Bush and Whittaker (1986). *Amblyolpium bellum* and *V. oca* were commonly found under the bark of living trees and logs, while *L. kapi* and *B. oceanicum* were present in the litter, along with *Paratemnus assimilis* which was collected once from litter on Rakata. *Geogarypus javanus*, *H. warburgi*, *M. yurii* and *P. assimilis* were taken by beating and sweeping vegetation.

(3) Montane zone. Only two pseudoscorpion species were collected in the montane zone, *L. kapi* and *Tyrannochthonius krakatau*. The latter is restricted to this zone.

In general, the pseudoscorpion fauna of the Krakataus is fairly well developed, especially considering that the fauna and flora of the islands was totally destroyed in the 1883 eruption (Thornton and Rosengren, in press). How then did they reach the islands, presumably from either Java, Sumatra or both? The three options are (1) phoresy, (2) rafting, or (3) by human introduction.

(1) Pseudoscorpions have long been known to attach themselves to larger animals, especially insects, and thus obtain transport. While none of the pseudoscorpions collected on these expeditions were undertaking phoresy, populations of many of the species may have become established after transportation on an aerial host.

Table 2. Occurrence of pseudoscorpion species on the Krakatau islands in relation to floral communities (Bush and Whittaker 1986) and collecting method.

	littoral	coastal <i>Casuarina</i>	lowland	montane
litter		<i>L. kapi</i> <i>B. oceanicum</i>	<i>L. kapi</i> <i>B. oceanicum</i> <i>P. assimilis</i>	<i>L. kapi</i> <i>T. krakatau</i>
bark	<i>G. maldivensis</i> <i>B. oceanicum</i> ( <i>M. yurii</i> ) ( <i>V. oca</i> )		<i>A. bellum</i> <i>V. oca</i> ( <i>M. yurii</i> )	
other		<i>G. javanus</i> <i>H. warburgi</i>	<i>G. javanus</i> <i>H. warburgi</i> <i>H. kraepelini</i> <i>M. yurii</i> <i>P. assimilis</i>	

(2) Banks of floating vegetation or logs may provide transport for some species, but submersion in sea water may kill many species. The specimens of *Garypus maldivensis* collected from under the bark of a dead tree on the shore of Rakata most probably dispersed to the island by rafting.

(3) While I have no solid evidence to suggest that pseudoscorpions have been transported to the islands through human agency, it is a possibility that cannot be easily discounted. There have been many visitors to the islands over the years, and introductions may have occurred, especially in items such as food (e.g. bananas, coconuts, etc.), or on pieces of timber or branches and logs. This is especially likely for species such as *Haplochernes warburgi* which is at least partially diurnal (see above).

## Systematics

### Chthoniidae

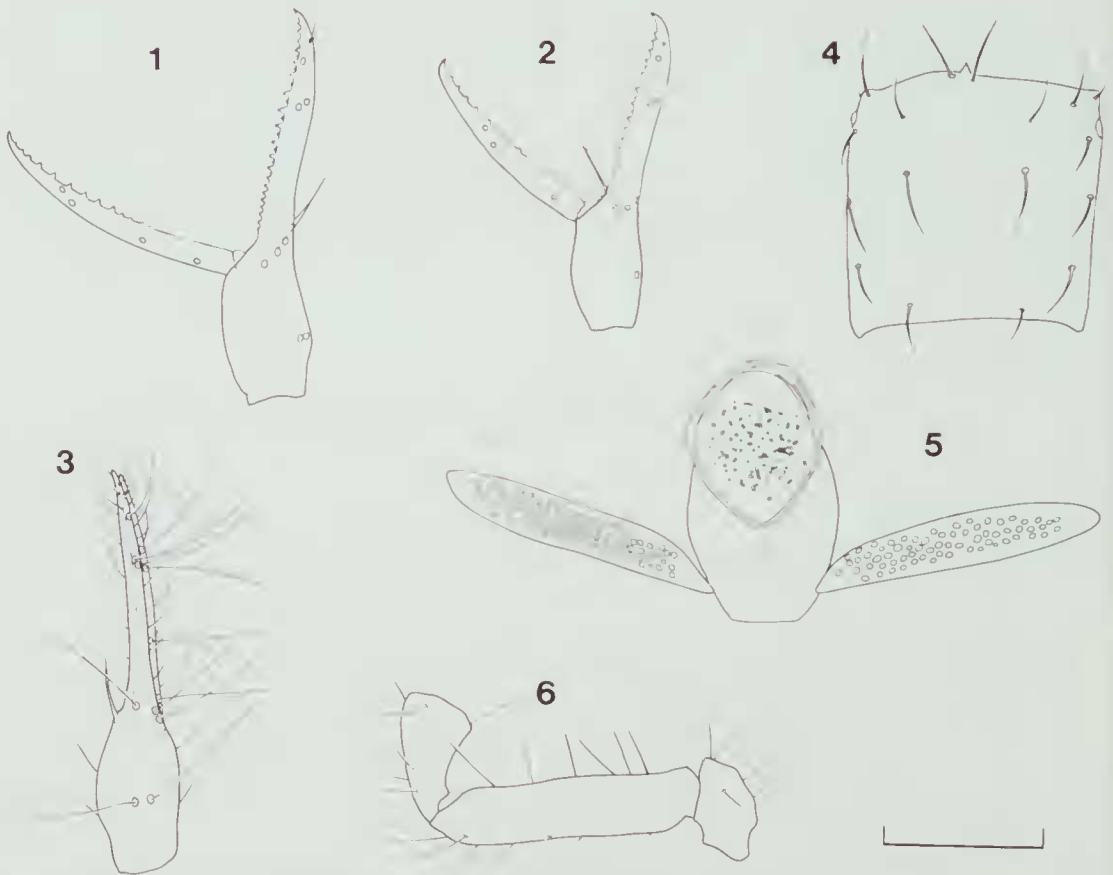
#### *Tyrannochthonius* Chamberlin

#### *Tyrannochthonius krakatau* sp. nov.

#### Figures 1-6

*Type material.* Holotype ♀, Rakata, summit, Krakatau Islands, 6°09'S, 105°26'E, 813 m, 19 Sep 1984, litter (MZB, 48-B, MH842.01, S1).

Paratypes: 3 ♀, same data as holotype (MZB, 48-B, MH842.02-04, S1); 5 ♀, same data as holotype (1 ♀ in ANIC, remainder in NMV, K714-717, 40-29, MH844.01-05, S1 and SP); 1 ♀, 1 tritonymph, Pulau Peucang, Ujung Kulon, Java, 6°45'S, 105°15'E, 19 Sep 1984, litter



Figures 1-6. *Tyrannochthonius krakatau* sp. nov. Figs 1, 4, 5, holotype female. Figs 3, 6, paratype female, MH844.04. Fig. 2, paratype tritonymph, MH816.02. Fig. 1, left chela, lateral. Fig. 2, left chela, lateral. Fig. 3, right chela, dorsal. Fig. 4, carapace. Fig. 5, genitalia, ventral. Fig. 6, right pedipalp, ventral. Scale line = 0.17 mm (figs 1-4, 6), 0.06 mm (fig. 5).

(MZB, 119-AN, MH816.01-02, SL).

**Diagnosis.** The only other described Asian or Australasian species of *Tyrannochthonius* that possess only two eyes are *T. laevis* Beier, *T. similidentatus* Sato and *T. bagus* sp. nov. *Tyrannochthonius krakatau* differs from *T. laevis* by its more prominent chelal teeth, from *T. similidentatus* by its heterodontate fixed chelal finger, and from *T. bagus* by the small intercalary teeth on the moveable chelal finger and by the form of the female genitalia.

**Description.** Female only. Colour pale yellow-brown, pedipalps and carapace slightly darker. Setae acuminate. Pleural membrane papillo-striate. Pedipalp (Figs 3, 6): trochanter 1.35–1.69, femur 4.13–4.36, tibia 1.72–1.83, chela 4.85–5.05, hand 1.50–1.73 times as long as broad. Fixed chelal finger and hand with 8 trichobothria, moveable chelal finger with 4 trichobothria; *ib* and *isb* on dorsum of hand (Fig. 1). Hand with 1 stout, medial, lanceolate, spine-like seta at level of *ist*. Venom apparatus absent. Chelal teeth: fixed finger with 19–20 large, well-spaced, erect teeth, plus 10 small intercalary teeth between anterior teeth; moveable finger with 9 well-spaced, erect teeth, plus 8 small intercalary teeth between anterior teeth, and 9–10 low, rounded basal teeth. Moveable finger twice as long as hand; moveable finger with very small basal apodeme. Chelicera with 5 setae on hand, all acuminate; flagellum of 6 blades; moveable finger with 1 seta; galea a very low elevation. Carapace (Fig. 4) 0.95–1.05 times as long as broad; 2 small corneate eyes; epistome acutely triangular, with 2 closely appressed setae; with m4m: 4: 4: 2: 2 setae. Tergites and sternites undivided. Tergal chaetotaxy: 4: 4: 4: 4: 4: 4: 4: 4: 4: 0. Sternal chaetotaxy: 9–10: (3)8–9(3): (3)6–10(3): 8–10: 9–10: 8: 8–9: 8–9: 7–9: 0: 2. Coxal chaetotaxy: 3: 3cs: 5: 5; coxae II with 6–8 distally incised coxal spines set in oblique row; intercoxal tubercle absent. Genital opercula not unusual. Female genitalia as in Fig. 5. Spiracles with stigmatic helix. Legs: heterotarsate, arolium slightly shorter than claws; claws simple.

Dimensions (mm): body length 0.85–0.93; pedipalps: trochanter 0.115–0.135/ 0.08–0.085, femur 0.305–0.335/0.07–0.08, tibia 0.155–0.165/ 0.085–0.09, chela 0.46–0.49/0.095–0.10, hand length 0.155–0.165, moveable finger length 0.305–0.33; chelicera 0.26–0.275/0.135–0.155, moveable finger length 0.14–0.155; carapace 0.28–0.295/0.28–0.30, cyc 0.025; leg I: trochanter 0.075–0.09/ 0.055–0.065, basifemur 0.17–0.18/ 0.045–0.05, telofemur 0.09–0.095/ 0.04–0.045,

tibia 0.07–0.105/0.03–0.035, tarsus 0.175–0.19/ 0.03; leg IV: trochanter 0.11/0.075–0.08, basifemur 0.125–0.145/0.12–0.125, telofemur 0.185–0.20/ 0.11–0.125, tibia 0.185–0.195/0.05–0.055, basitarsus 0.085–0.115/0.03–0.045, telotarsus 0.175–0.18/ 0.03.

Tritonymph: colour pale. Pedipalp: trochanter 1.62, femur 3.69, tibia ?, chela 4.23, hand 1.35 times as long as broad. Fixed chelal finger and hand with 7 trichobothria, moveable finger with 3 trichobothria; *isb* and *sb* absent (Fig. 2). Carapace with m4m: 4: 4: 2: 2 setae; 1.15 times as long as broad. Tergal chaetotaxy: 4: 4: 4: 4: 4: 4: 4: 4: 4: 0. Sternal chaetotaxy: 5: (2)4(2): (2)5(2): 6: 6: 6: 6: 7: 0: 2. Coxal chaetotaxy: 3: 3cs: 4: 4; coxae II with 5–6 distally incised spines set in oblique row. Heterotarsate.

Dimensions (mm): body length 0.64; pedipalps: trochanter 0.105/0.065, femur 0.24/0.065, tibia ?, chela 0.36/0.085, hand length 0.115, moveable finger length 0.245; carapace 0.235/0.205.

**Etymology.** The specific epithet refers to the group of islands on which this species has been found and is to be treated as a noun in apposition.

**Remarks.** This species has been collected in litter only on the summit of Rakata and at Pulau Peueang.

#### *Tyrannochthonius bagus* sp. nov.

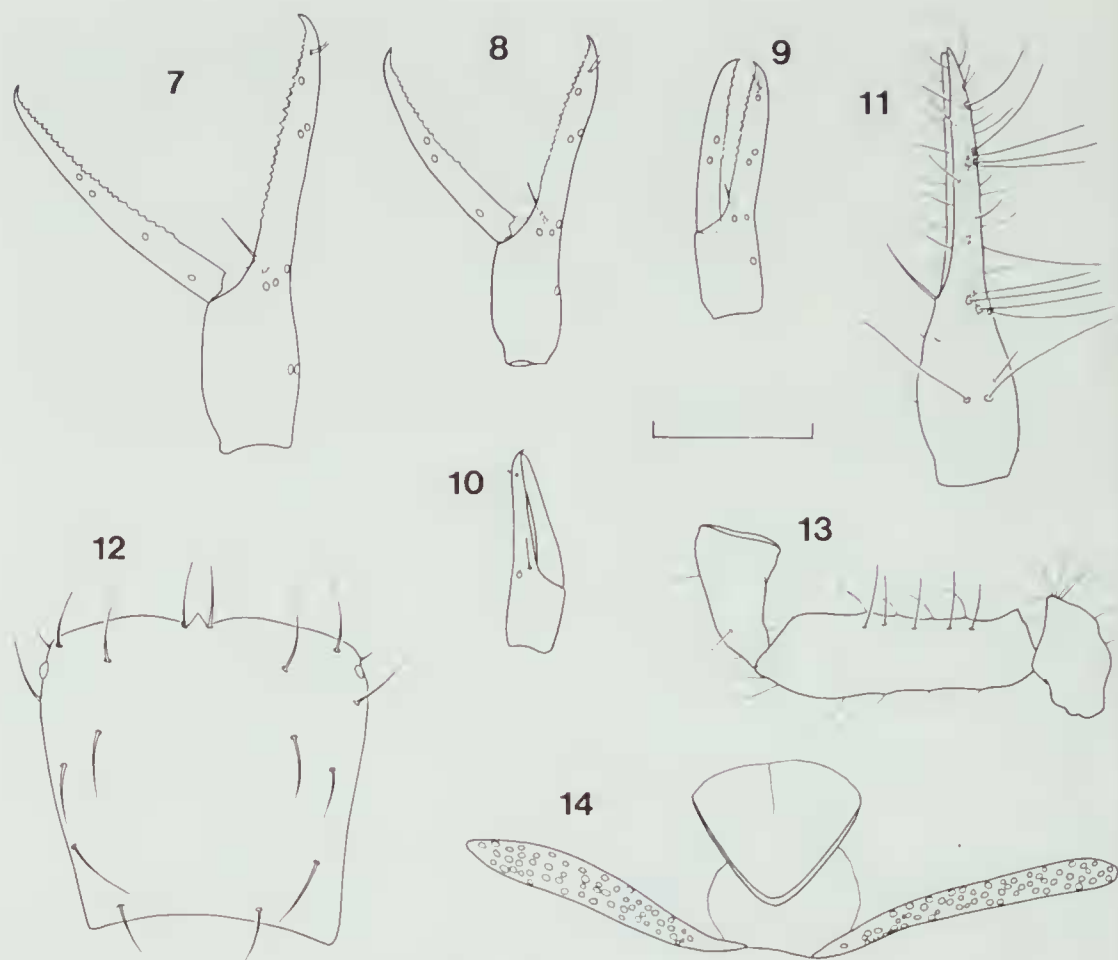
Figures 7–14

**Type material.** Holotype ♀, 7.5 km W of Liwa, Sumatra, 5°04'S, 104°03'E, 730 m, litter, 1 Sep 1984 (MZB, 91-M, MH807.01, SL).

Paratypes: 9 ♀, 2 tritonymphs, 1 protonymph, same data as holotype (MZB, 91-M, MH807.02–13, SL and SP); 15 ♀, 2 tritonymphs, 1 deutonymph, same data as holotype except 6 Sep 1984 (2 ♀, 1 deutonymph in MZB, 2 ♀ in ANIC, remainder in NMV, K718-730, 148-Q, MH809.01–18, SL and SP); 9 ♀, 6 km W of Liwa, Sumatra, 5°04'S, 104°03'E, 640 m, litter, 5 Sep 1984 (MZB, 150-M, MH808.01–09, SP).

**Diagnosis.** As discussed under the diagnosis of *T. krakatau*, *T. bagus* resembles *T. laevis*, *T. similidentatus* and *T. krakatau* in possessing only two eyes. *Tyrannochthonius bagus* differs from *T. laevis* in its erect chelal teeth, from *T. similidentatus* in its heterodontate chelal teeth, and from *T. krakatau* in the large intercalary teeth of the moveable chelal finger and the form of the female genitalia.

**Description.** Female only. Colour pale yellow-brown, pedipalps and carapace slightly darker. Setae acuminate. Pleural membrane papillo-striate.



Figures 7-14. *Tyrannochthonius bagus* sp. nov. Figs 7, 11, 13, 14, holotype female. Fig. 8, paratype tritonymph, MH809.16. Fig. 9, paratype deutonymph, MH809.18. Fig. 10, paratype protonymph, MH807.13. Fig. 12, paratype female, MH809.01. Fig. 7, left chela, lateral. Fig. 8, left chela, lateral. Fig. 9, left chela, lateral. Fig. 10, left chela, lateral. Fig. 11, right chela, dorsal. Fig. 12, carapace. Fig. 13, left pedipalp, dorsal. Fig. 14, genitalia, ventral. Scale line = 0.17 mm (figs 7-13), 0.06 mm (fig. 14).

Pedipalp (Figs 11, 13): trochanter 1.58-1.71, femur 3.37-3.83, tibia 1.80-1.90, chela 4.35-4.71, hand 1.48-1.57 times as long as broad. Fixed chelal finger and hand with 8 trichobothria, moveable chelal finger with 4 trichobothria; *ib* and *isb* on dorsum of hand (Fig. 7). Hand with 1 stout medial spine-like seta at level of *ist*. Venom apparatus absent. Chelal teeth: fixed finger with 22-23 large, well-spaced, retrorse teeth, plus 16-18 large intercalary teeth; moveable finger with 20-25 well-spaced, retrorse teeth, plus 11-14 large intercalary teeth. Moveable finger twice as long as hand; moveable finger with very small basal apodeme. Chelicera with 5 setae on hand, all acuminate; flagellum of 7 blades; moveable finger with 1 seta;

galea a very low elevation. Carapace (Fig. 12) 0.90-1.00 times as long as broad; 2 small corneate eyes; epistome acutely triangular, with 2 closely appressed setae; with *m4m*: 4: 4: 2: 2 setae. Tergites and sternites undivided. Tergal chaetotaxy: 4: 4: 4: 4: 4: 4: 4: 4: 4: 4: 0. Sternal chaetotaxy: 10: (2)10(2): (2)10(2): 10: 9-10: 9: 9: 9-10: 9-10: 0: 2. Coxal chaetotaxy: 3-4: 2-4cs: 5: 5; coxae II with 5-7 distally incised coxal spines set in oblique row; intercoxal tubercle absent. Genital opercula not unusual. Female genitalia (Fig. 14) with long, narrow lateral diverticulum. Spiracles with stigmatic helix. Legs: heterotarsate, arolium slightly shorter than claws; claws simple.

Dimensions (mm): body length 0.91-1.05;



pedipalps: trochanter 0.145–0.155/0.085–0.095, femur 0.32–0.345/0.09–0.095, tibia 0.18–0.185/0.095–0.10, chela 0.48–0.50/0.105–0.115, hand length 0.165–0.18, moveable finger length 0.32–0.35; chelicera 0.29–0.30/0.15–0.18, moveable finger length 0.165–0.175; carapace 0.325–0.345/0.345–0.37; leg I: trochanter 0.09–0.095/0.07–0.075, basifemur 0.185–0.195/0.06, telofemur 0.10–0.105/0.06, tibia 0.105–0.11/0.04–0.045, tarsus 0.17–0.185/0.03–0.035; leg IV: trochanter 0.115–0.12/0.08–0.09, basifemur 0.19–0.195/0.14–0.145, telofemur 0.205–0.215/0.13–0.135, tibia 0.20–0.21/0.06–0.065, basitarsus 0.09–0.095/0.045–0.05, telotarsus 0.175–0.18/0.035–0.04.

Tritonymph: colour pale. Pedipalp: trochanter 1.60–1.64, femur 3.29–3.46, tibia 1.71, chela 4.06–4.12, hand 1.35–1.44 times as long as broad. Fixed chelal finger and hand with 7 trichobothria, moveable finger with 3 trichobothria; *isb* and *sb* absent (Fig. 8). Carapace with m4m: 4: 4: 2: 2 setae. Tergal chaetotaxy: 4: 4: 4: 4: 4: 4: 4: 4: 4: 4: 0. Sternal chaetotaxy: 5: (2)4(2): (2)6(2): 7–8: 6–8: 7: 7: 7: 6–7: 0: 2. Coxal chaetotaxy: 3: 3–4cs: 4: 4; coxae II with 5 distally incised spines set in oblique row. Heterotarsate.

Dimensions (mm): body length 0.72–0.75; pedipalps: trochanter 0.115–0.12/0.07–0.075, femur 0.225–0.23/0.065–0.07, tibia 0.12/0.07, chela 0.35–0.365/0.085–0.09, hand length 0.115–0.13, moveable finger length 0.24–0.25; carapace 0.27/?.

Deutonymph: colour pale. Pedipalp: trochanter 1.80, femur 3.50, tibia 1.79, chela 3.21, hand 1.43 times as long as broad. Fixed chelal finger and hand with six trichobothria, moveable finger with two trichobothria; *esb*, *isb*, *sb* and *b* absent (Fig. 9). Carapace with m4m: 4: 4: 2: 2 setae; 0.98 times as long as broad. Tergal chaetotaxy: 4: 4: 4: 4: 4: 4: 4: 4: 4: 4: 0. Sternal chaetotaxy: 2: (0)4(0): (0)4(0): 6: 6: 6: 6: 6: 6: 0: 2. Coxal chaetotaxy: 2: 3cs: 3: 3; coxae II with three distally incised spines set in oblique row. Heterotarsate.

Dimensions (mm): body length 0.60; pedipalps: trochanter 0.09/0.05, femur 0.175/0.05, tibia 0.125/0.07, chela 0.225/0.07, hand length 0.10, moveable finger length 0.19; carapace 0.22/0.225.

Protonymph: colour pale. Pedipalp: trochanter 1.60, femur 3.22, tibia ?, chela 3.69, hand 1.15 times as long as broad. Fixed chelal finger with 3 trichobothria, moveable finger with 1 trichobothrium; *eb*, *et*, *ist* and *t* present (Fig. 10). Carapace with 4: 4: 4: 2: 2 setae; 0.84 times as long as broad. Tergal chaetotaxy: 2: 2: 2: 2: 4: 4: 4: 4: 2: 4: 0. Sternal chaetotaxy: 2: (0)0(0): (0)2(0):

2: 4: 4: 4: 4: 0: 2. Coxal chaetotaxy: 1: 1cs: 1: 1; coxae II with 2 distally incised spines set in oblique row. Heterotarsate.

Dimensions (mm): body length 0.45; pedipalps: trochanter 0.08/0.05, femur 0.145/0.045, tibia ?, chela 0.24/0.065, hand length 0.075, moveable finger length 0.16; carapace 0.205/0.245.

*Etymology.* The specific epithet is Bahasa Indonesian meaning "good" and is to be treated as an indeclinable noun.

*Remarks.* This is only the second record of a true member of the genus *Tyrannochthonius* from Sumatra. The first is that of *T. terribilis* (With) by Beier (1930) from Padang. Examination of the syntypes of *T. terribilis* (lodged in UZM) revealed that it possesses homodentate chelal fingers, unlike *T. bagus* which possesses heterodentate fingers.

#### Lagynochthonius Beier

##### *Lagynochthonius kapi* sp. nov.

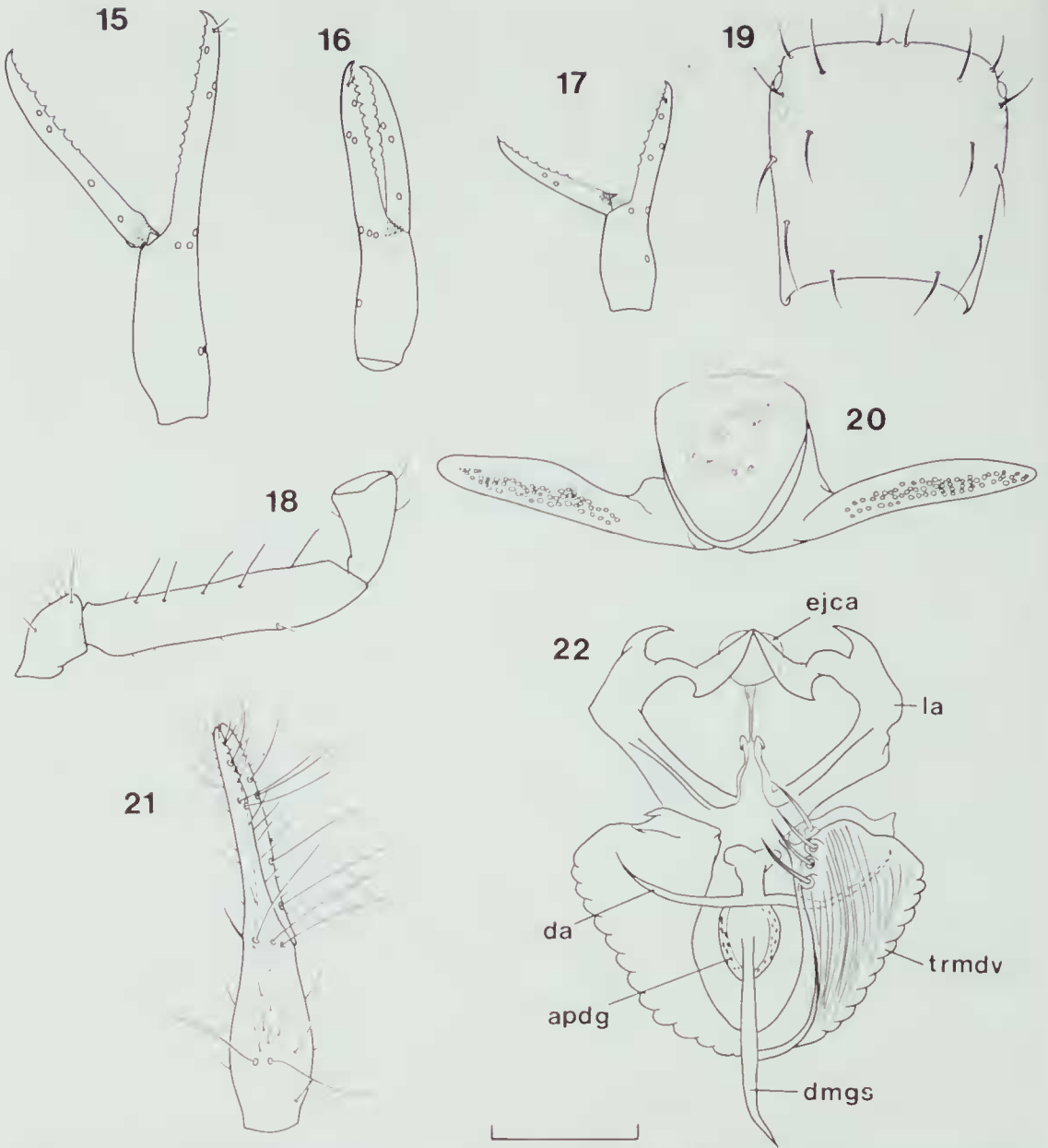
Figures 15–22

*Type material.* Holotype ♂, Zwarte Hoek, Rakata, Krakatau Islands, 6°09'S, 105°25'E, litter, 12 Sep 1984 (MZB, 156-R, MH820.01, SL).

Paratypes: 5 ♀, same data as holotype (MZB, 156-R, MH820.02–06, SL); 1 ♀, Rakata, summit, Krakatau Islands, 6°09'S, 105°26'E, 813 m, litter, 19 Sep 1984 (MZB, 40–29, MH844.06, SL); 2 ♂, Rakata, summit, Krakatau Islands, 6°09'S, 105°26'E, 813 m, litter, 19 Sep 1984 (MZB, 46–8, MH843.01–02, SL); 3 ♂, 5 ♀, 1 tritonymph, Panjang, Krakatau Islands, 6°05'S, 105°28'E, rainforest litter, 14 Sep 1984 (NMV, K731–739, 154-P, MH861.01–09, SL and SP); 2 ♂, 2 ♀, 1 tritonymph, Sertung, Krakatau Islands, 6°04'S, 105°24'–25'E, *Casuarina equisetifolia* litter, 11 Sep 1984 (MZB, 151-D, MH851.01–05, SP); 4 ♂, 3 ♀, 1 tritonymph, 2 deutonymphs, Anak Krakatau, Krakatau Islands, 6°06'S, 105°26'E, *Casuarina equisetifolia* litter, 10 Sep 1984 (1 ♂, 1 ♀, 1 deutonymph in NMV, K740–742, 1 ♂, 1 ♀ in ANIC, remainder in MZB, 152-I, MH869.01–10, SL); 3 ♂, 1 ♀, Anak Krakatau, Krakatau Islands, 6°06'S, 105°26'E, under rock, 10 Sep 1984 (MZB, 109-E, MH871.01–04, SP).

*Diagnosis.* This species is approached in its small size only by *L. bakeri* (Chamberlin), *L. brincki* (Beier), and *L. dybasi* (Beier). The latter possesses very slender chelae and the teeth of *L. brincki* are more widely spaced, extending on the moveable finger well past the level of *sb*. It is most similar to *L. bakeri*, from which it differs by possession of intercalary teeth on the moveable chelal finger.

*Description.* Adults: Pale yellow-brown, pedipalps and carapace slightly darker. Setae acuminate. Pleural membrane papillo-striate. Pedipalp (Figs 21, 18): trochanter 1.64–1.79 (♂), 1.64–1.80 (♀),



Figures 15-22. *Lagynochthonius kapi* sp. nov. Figs 15, 19, 22, holotype male. Fig. 16, paratype tritonymph, MH869.08. Fig. 17, paratype deutonymph, MH869.09. Fig. 18, paratype female, MH861.04. Fig. 20, paratype female, MH861.05. Fig. 21, paratype female, MH861.04. Fig. 15, left chela, lateral. Fig. 16, right chela, lateral. Fig. 17, left chela, lateral. Fig. 18, right pedipalp, dorsal. Fig. 19, carapace. Fig. 20, genitalia, ventral. Fig. 21, right chela, dorsal. Fig. 22, genitalia, ventral, detail of trmdv not shown in right half. Scale line = 0.17 mm (figs 15-19, 21), 0.06 mm (figs 20, 22).

femur 4.53-4.93 (♂), 4.35-5.00 (♀), tibia 1.93-2.21 (♂), 1.82-1.88 (♀), chela 5.33-5.61 (♂), 5.00-5.10 (♀), hand 2.28-2.39 (♂), 2.09-2.25 (♀) times as long as broad. Fixed chelal finger and hand with 8 trichobothria, moveable chelal finger with

4 trichobothria (Fig. 15); *ib* and *isb* on dorsum of hand, *st* close to *t*. Hand with 1 medial acuminate spine-like seta at level of *ist*. Venom apparatus absent. Chelal teeth: fixed finger with 11-15 (♂), 15-16 (♀) large, well-spaced, slightly retrorse teeth,

plus several very small intercalary teeth between anterior teeth; moveable finger with 7-9 ( $\sigma$ ) 7-8 ( $\varnothing$ ) well-spaced teeth in anterior half, plus 2-5 ( $\sigma$ ), 1-3 ( $\varnothing$ ) small intercalary teeth between anterior teeth, remaining teeth low and rounded; terminal tooth of moveable finger not appearing hooked. Fixed finger of male with distal sensorium near *ds*. Moveable finger longer than hand; hand slightly constricted distally; moveable chelal finger with large basal apodeme. Chelicera with 5 setae on hand, all acuminate; flagellum of 8 blades; moveable finger with 1 seta; galeal region a very low elevation. Carapace (Fig. 19) 0.90-1.00 ( $\sigma$ ), 0.85-0.97 ( $\varnothing$ ) times as long as broad; 4 eyes, anterior eye corneate, posterior pair represented by eye spots; epistome very low, with 2 closely appressed setae; with m4m: 4: 4: 2: 2 setae. Tergites and sternites undivided. Tergal chaetotaxy:  $\sigma$ , 4: 4: 4: 4-6: 5-6: 5-6: 5-6: 6: 5-6: 3-4: 4: 0;  $\varnothing$ , 4: 4: 4: 6-7: 6-7: 7: 6-7: 5-6: 4: 4: 0. Sternal chaetotaxy:  $\sigma$ , 10: (3)24-28 [8] (3): (3)7-9(3): 8-10: 8-10: 9-10: 8-9: 8-10: 8-10: 4: 0;  $\varnothing$ , 10: (3)10-11(3): (3)6-8(3): 8-10: 8-10: 8-10: 9-10: 9-11: 9-10: 4: 0. Coxal chaetotaxy:  $\sigma$ , 3: 4cs: 5: 5;  $\varnothing$ , 3-4: 4cs: 5: 5; coxae II with 5-7 distally incised spines set in oblique row; intercoxal tubercle absent. Genital opercula not unusual. Male genitalia (Fig. 22): ejaculatory atrium small, lateral apodeme meeting in mid-line; lateral margin of thickened roof of median diverticulum crenulate. Female genitalia (Fig. 20) with complete lateral apodeme frame, although anterior margin very faint; lateral diverticulum covered with cribriform plates in central section. Spiracles with stigmatic helix. Legs: heterotarsate; arolium slightly shorter than claws; claws simple.

Dimensions (mm),  $\sigma$  ( $\varnothing$ ): body length 0.88-0.98 (0.94-1.10); pedipalps: trochanter 0.115-0.13/0.07-0.075 (0.115-0.14/0.07-0.085), femur 0.32-0.345/0.07-0.075 (0.345-0.375/0.075-0.085), tibia 0.145-0.16/0.07-0.08 (0.15-0.165/0.08-0.09), chela 0.48-0.505/0.09 (0.505-0.56/0.10-0.11), moveable finger length 0.27-0.29 (0.275-0.32), hand length 0.205-0.215 (0.21-0.23); chelicera 0.24-0.255/0.12-0.135 (0.27-0.29/0.14-0.16), moveable finger length 0.12-0.14 (0.14-0.16); carapace 0.27-0.295/0.29-0.315 (0.29-0.305/0.315-0.34); leg I: trochanter 0.085/0.07 (0.09-0.095/0.07-0.075), basifemur 0.175-0.20/0.045-0.05 (0.185-0.21/0.045-0.05), telofemur 0.09-0.11/0.04-0.045 (0.095-0.115/0.04-0.045), tibia 0.095-0.11/0.03 (0.095-0.12/0.035), tarsus 0.19-0.205/0.025-0.03 (0.19-0.235/0.03); leg IV: trochanter 0.11/0.075 (0.105-0.13/0.08-0.095), basifemur 0.145-0.165/0.15-0.165 (0.16-0.175/0.145-0.16), telofemur 0.225-0.25/0.13-0.16

(0.235-0.25/0.14-0.155), tibia 0.21-0.23/0.055-0.065, basitarsus 0.095-0.105/0.04-0.045 (0.10-0.115/0.045-0.05), telotarsus 0.205-0.225/0.025-0.03 (0.215-0.25/0.025-0.03).

Tritonymphs: colour pale. Pedipalp: trochanter 1.46-1.67, femur 3.77-4.17, tibia 1.71, chela 4.53-5.07, hand 2.00-2.13 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria; *isb* and *sb* absent (Fig. 16). Fixed chelal finger with 12 teeth, without intercalary teeth, moveable chelal finger with 6 teeth, without intercalary teeth. Chelicera with 5 setae on hand; flagellum of 5 pinnate blades. Carapace 1.07-1.23 times as long as broad; with m4m: 4: 4: 2: 2 setae. Tergal chaetotaxy: 4: 4: 4: 4-6: 5: 6: 5-6: 5: 5: 4: 4: 0. Sternal chaetotaxy: 5: (2)6(2): (2)6(2): 6-7: 7: 7: 7: 6-7: 7: 0: 2. Coxal chaetotaxy: 3: 3cs: 4: 4; coxae II with 5 distally incised spines. Heterotarsate.

Dimensions (mm): body length 0.67-0.73; pedipalps: trochanter 0.095-0.10/0.06-0.065, femur 0.245-0.25/0.06-0.065, tibia 0.12/0.07, chela 0.38-0.385/0.075-0.085, moveable finger length 0.215-0.225, hand length 0.16-0.17; carapace 0.245/0.20-0.23.

Deutonymphs: colour pale. Pedipalp: trochanter 1.50-1.60, femur 3.27-3.60, tibia ?, chela 4.38-4.58, hand 1.85-2.42 times as long as broad. Fixed chelal finger with 6 trichobothria, moveable chelal finger with 2 trichobothria; *esb*, *isb*, *sb* and *b* absent. (Fig. 17). Fixed chelal finger with 9 teeth, without intercalary teeth, moveable chelal finger with 5-6 teeth, without intercalary teeth. Chelicera with 4 setae on hand; flagellum of 5 pinnate blades. Carapace 1.00-1.03 times as long as broad; with m4m: 4: 4: 2: 2 setae. Tergal chaetotaxy: 4: 4: 4: 4: 4: 4: 4: 4: 2: 0. Sternal chaetotaxy: ? Coxal chaetotaxy: 2: 3cs: 3: 3; coxae II with 4 distally incised spines. Heterotarsate.

Dimensions (mm): body length 0.51; pedipalps: trochanter 0.075-0.08/0.05, femur 0.18/0.05-0.055, tibia ?, chela 0.275-0.285/0.06-0.065, moveable finger length 0.17, hand length 0.12-0.145; carapace 0.195-0.21/0.19-0.21.

*Etymology.* "Kapi" is the name used in the ancient Javanese book "Pustaka Raja" ("Book of Kings") for Krakatau. "Kapi" erupted in A.D. 416 (Judd, 1889). It is to be treated as an indeclinable noun.

*Remarks.* The "tubercle-like sensorium" of the tip of the fixed chelal finger reported for the male holotype of *Lagynochthonius bakeri* (Chamberlin) by Chamberlin (1962) is present in all the males of the genus that I have examined, yet is absent from the females. I cannot detect a similar structure in

the males of various species of *Tyrannochthonius* I have examined, and thus the character appears to be diagnostic for males of the genus *Lagynochthonius*.

***Lagynochthonius johni* (Redikorzev)**

Figures 23-29

*Chthonius johni* Redikorzev, 1922: 550-554, figs 5-9.

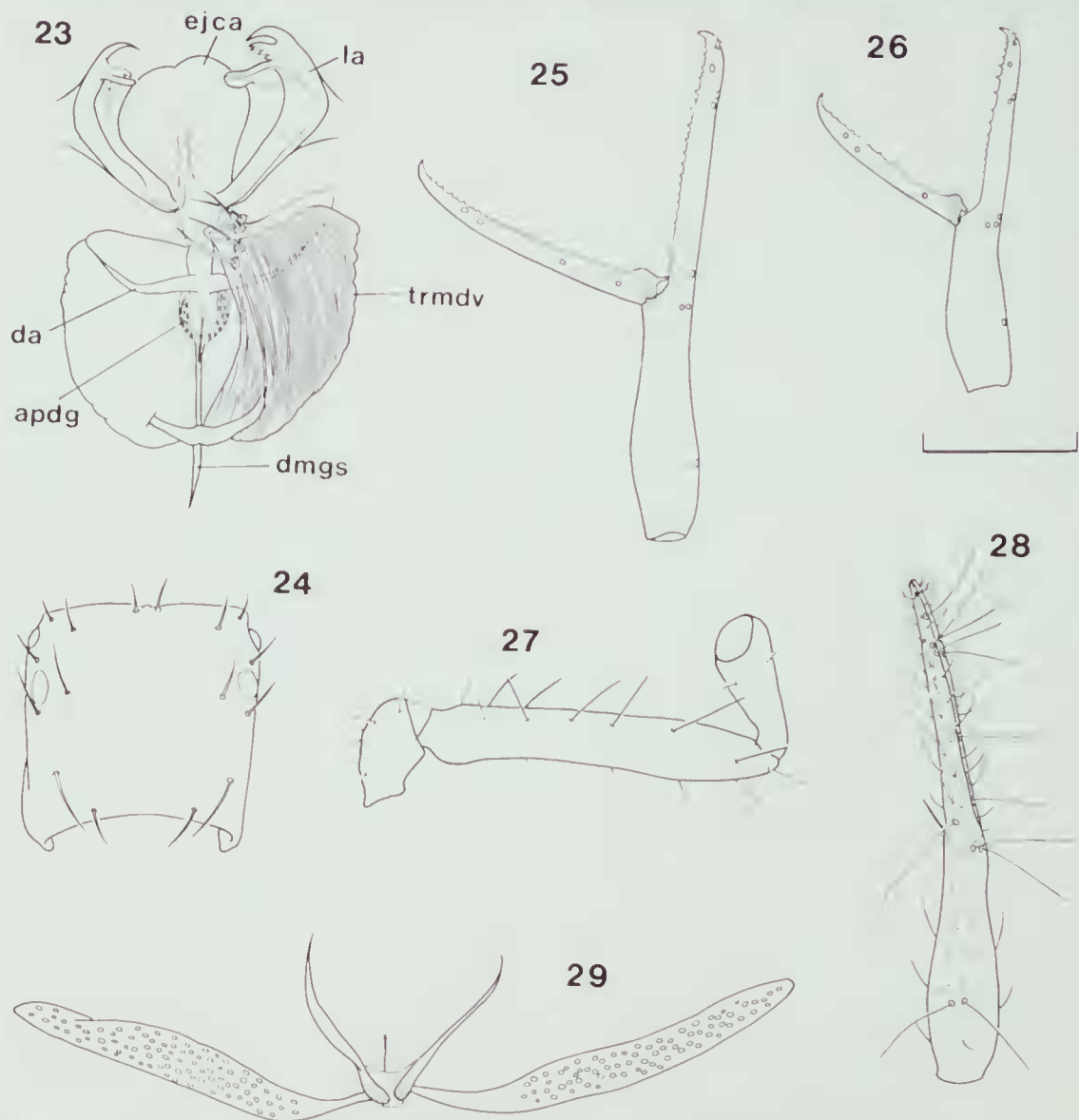
*Tyrannochthonius johni* (Redikorzev). - Chamberlin, 1929: 75.

*Tyrannochthonus (Lagynochthonius) johni* (Redikorzev). - Beier, 1966b: 340.

*Lagynochthonus johni* (Redikorzev). - Chamberlin, 1962: 314.

*Etype material.* Holotype ♂, Siak, Sumatra, 21 Apr 1913, O. John (ZII?, not examined).

*Other material examined.* Java. Ujung Kulon, Pulau



Figures 23-29. *Lagynochthonius johni* (Redikorzev). Figs 23, 25, 27, 28, male, MH815.01. Fig. 24, male, MH816.03. Fig. 26, tritonymph, MH815.03. Fig. 29, female, MH815.02. Fig. 23, genitalia, ventral, detail of trmdv not shown in right half. Fig. 24, carapace. Fig. 25, left chela, lateral. Fig. 26, left chela, lateral. Fig. 27, right pedipalp, dorsal. Fig. 28, right chela, dorsal. Fig. 29, genitalia, ventral. Scale line = 0.09 mm (Fig. 23), 0.20 mm (figs 24-28), 0.06 mm (fig. 29).

Peucang, 5°45'S, 105°15'E, litter, 19 Sep 1984, 1 ♂, 1 ♀, 1 tritonymph (MZB, 119-Q, MH815.01-03, SL); same data, 1 ♂, 2 tritonymphs (NMV, 119-AN, MH816.03-05, SL).

*Diagnosis.* The only other species of the genus of comparable size and with such a slender chela are *L. tonkinensis* (Beier), *L. novaeguineae* (Beier) and *L. arctus* (Beier). The latter possesses a much more slender chela, while the other two have fewer teeth on the chelal fingers.

*Description.* Adults: colour pale yellow-brown, pedipalps and carapace slightly darker. Setae acuminate. Pleural membrane papillo-striate. Pedipalp (Figs 27-28): trochanter 1.67-2.07 (♂), 1.76 (♀), femur 5.94-6.18 (♂), 5.75 (♀), tibia 2.31-2.59 (♂), 2.38 (♀), chela 6.70-7.20 (♂), 5.85 (♀), hand 3.25-3.35 (♂), 2.74 (♀) times as long as broad. Fixed chelal finger and hand with 8 trichobothria, moveable chelal finger with 4 trichobothria (Fig. 25); *ib* and *isb* on dorsum of hand, *st* close to *t*. Hand with 1 medial acuminate spine-like seta at level of *ist*. Venom apparatus absent. Chelal teeth: fixed finger with 19-20 (♂), 19 (♀) large, well-spaced, slightly retrorse teeth, plus 7-8 (♂), 9 (♀) small intercalary teeth between anterior teeth, and several low, rounded teeth basally; moveable finger with 8-9 (♂), 8 (♀) well-spaced teeth in anterior half, plus 6 (♂, ♀) small intercalary teeth between anterior teeth, remaining teeth low and rounded; terminal tooth of moveable finger not appearing hooked. Fixed finger with small distal sensorium near *ds* in male only. Moveable finger longer than hand; hand strongly constricted distally; moveable chelal finger with large basal apodeme. Chelicera with 5 setae on hand, all acuminate; flagellum of 7 blades; moveable finger with 1 seta; galeal region a very low elevation. Carapace (Fig. 24) 0.91-0.96 (♂), 0.84 (♀) times as long as broad; 4 corneate eyes; epistome very low, with 2 closely appressed setae; with 4: 4: 4: 2: 2 setae. Tergites and sternites undivided. Tergal chaetotaxy: ♂, 4: 4: 4: 4: 4: 4-5: 5: 5: 4: 4: 0; ♀, 4: 4: 4: 4: 5: 5: 5: 5: 4: 4: 0. Sternal chaetotaxy: ♂, 10-11: (4)30-31 [8] (4): (4)7-8(4): 9-10: 9-10: 9: 9-10: 9: 9: 4: 2; ♀, 11: (4)10(4): (4)6(4): 9: 9: 9: 9: 9: 7: 4: 2. Coxal chaetotaxy: ♂, ♀, 3: 4cs: 5: 5; coxae II with 9-10 (♂, ♀) distally incised spines set in oblique row; intercoxal tubercle absent. Genital opercula not unusual. Male genitalia (Fig. 23): ejaculatory atrium large; lateral apodemes not meeting in midline; lateral margin of thickened roof of median diverticulum only slightly undulate. Female genitalia (Fig. 29) with incomplete lateral apodeme frame; lateral divertic-

ulum elongate, evenly covered with cribriform plates. Spiracles with stigmatic helix. Legs: heterotarsate, arolium slightly shorter than claws; claws simple.

Dimensions (mm), ♂ (♀): body length 1.08-1.21 (1.195); pedipalps: trochanter 0.14-0.165/0.085-0.095 (0.185/0.105), femur 0.475-0.525/0.08-0.085 (0.575/0.10), tibia 0.185-0.22/0.08-0.085 (0.25/0.105), chela 0.67-0.72/0.10 (0.79-0.795/135), moveable finger length 0.36-0.39 (0.415-0.425), hand length 0.32-0.335 (0.37-0.385); chelicera 0.295-0.31/0.155-0.16 (0.36/0.19), moveable finger length 0.16 (0.205); carapace 0.305-0.325/0.335-0.34 (0.345/0.41); leg I: trochanter 0.10-0.11/0.085-0.09 (0.12/0.095), basifemur 0.245-0.265/0.05-0.055 (0.295/0.06), telofemur 0.14-0.145/0.045-0.05 (0.16/0.05), tibia 0.125-0.145/0.04 (0.165/0.04), tarsus 0.27-0.275/0.03 (0.27/0.04); leg IV: trochanter 0.095-0.14/0.095-0.10 (0.165/0.10), basifemur 0.205-0.21/0.175-0.185 (0.225/0.19), telofemur 0.32-0.37/0.17-0.18 (0.38/0.185), tibia 0.29-0.30/0.06 (0.33/0.07), basitarsus 0.13-0.145/0.045-0.05 (0.155/0.055), telotarsus 0.31-0.33/0.03 (0.34/0.03).

Tritonymph: colour much paler than adults. Pedipalp: trochanter 1.71-1.79, femur 4.77-5.00, tibia 1.93-2.07, chela 5.88, hand 2.82 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria; *isb* and *sb* absent (Fig. 26). Fixed chelal finger with 16 teeth, plus 7 small intercalary teeth distally. Moveable chelal finger with 7-8 teeth. Chelicera with 5 setae on hand; flagellum of 6 pinnate blades. Carapace 1.00 times as long as broad; with 4: 4: 4: 2: 2 setae. Tergal chaetotaxy: 4: 4: 4: 4: 4: 4: 5: 5: 5: 4: 4: 0. Sternal chaetotaxy: 5: (2)7(2): (2)6(2): 7: 7: 7: 8: 7: 7: 2: 2. Coxal chaetotaxy: 3: 3cs: 4: 4; coxae II with 6-7 distally incised spines. Heterotarsate.

Dimensions (mm): body length 0.635-0.75; pedipalps: trochanter 0.12-0.125/0.07, femur 0.31-0.35/0.065-0.07, tibia 0.145/0.07-0.075, chela 0.50/0.085, moveable finger length 0.255-0.275, hand length 0.24-0.25; carapace 0.25/0.25.

*Remarks.* *Lagynochthonius johni* is the type species of the genus and was originally described from a single male collected from Siak, in east-central Sumatra (Redikorzev, 1922). Two other collections have been recorded in the literature as this species. The first was a short series from Java (Beier, 1930, 1932b), which Chamberlin (1962) regarded as representing a new species distinct from *L. johni*

which he named *L. roeweri* Chamberlin. Unlike Chamberlin, I have had the opportunity to examine the type material of *L. roeweri* which is lodged in SMF. Chamberlin's assessment is quite correct. The second collection of *L. johni* was a single female from the Philippines (Beier, 1966b); the specimen was not described.

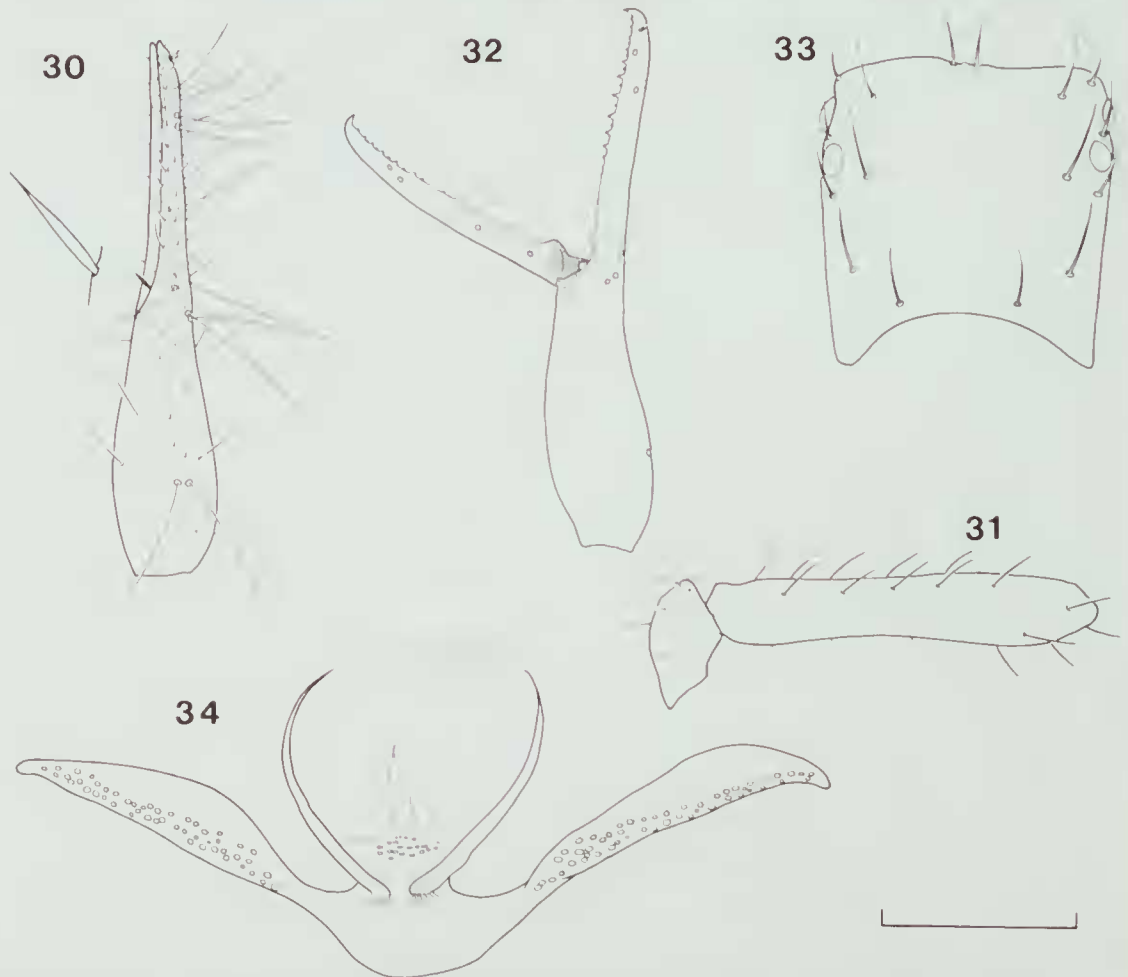
While I have not had the opportunity to examine the holotype of *L. johni*, the description by Redikorzev (1922) is generally accurate and I have few reservations in assigning the specimens from Ujung Kulon to this species. The following discrepancies between Redikorzev's description and the Ujung Kulon specimens are noted: (1) Redikorzev (1922, fig. 5) depicted the epistome as a large blunt trapezoidal projection, with the anterior eye placed at the edge of the carapace. Redikorzev

seems to have mistaken the posterior edge of the chelicerae for the anterior margin of the carapace and thus draw the epistome far too large and the eyes too close to the anterior margin of the carapace. (2) The dentition of the cheliceral fingers is slightly different, but I prefer to ascribe this to intraspecific variation, especially as the dentition varies within individuals. (3) The very low carapaceal and tergal chaetotaxies recorded for the holotype by Redikorzev (1922) is probably incorrect and, as noted by Chamberlin (1962), setae may have been lost from from the specimen.

***Lagynochthonius thorn-toni* sp. nov.**

Figures 30–34

*Type material.* Holotype ♀, Pulau Peucang, Ujung Kulon, Java, 5 45'S, 105 15'E, under bark of log on



Figures 30–34. *Lagynochthonius thorn-toni* sp. nov., holotype female. Fig. 30, right chela, dorsal. Fig. 31, trochanter and femur of right pedipalp, dorsal. Fig. 32, left chela, lateral. Fig. 33, carapace. Fig. 34, genitalia, ventral. Scale line = 0.25 mm (figs 30–33), 0.07 mm (fig. 34).

beach, 19 Sep 1984 (MZB, 17-C, MH814.01, SL).

*Diagnosis.* This is the only described species of the genus with a lanceolate chelal spine-like seta.

*Description.* Female only. Colour pale yellow-brown, pedipalps and carapace slightly darker. Setae acuminate. Pleural membrane papillo-striate. Pedipalp (Figs 30, 31): trochanter 1.80, femur 5.63–5.74, tibia ?, chela 5.21, hand 2.64 times as long as broad. Fixed chelal finger and hand with 8 trichobothria, moveable chelal finger with 4 trichobothria; *ib* and *isb* on dorsum of hand, *st* close to *t* (Fig. 32). Hand with 1 medial lanceolate spine-like seta at level of *ist* (Fig. 30). Venom apparatus absent. Chelal teeth: fixed finger with 17 large, well-spaced, slightly retrorse teeth, plus 9 small intercalary teeth between anterior teeth; moveable finger with 7 well-spaced teeth in anterior half, plus 2 small intercalary teeth between anterior teeth, remaining teeth low and rounded; terminal tooth of moveable finger not appearing hooked. Fixed finger without distal sensorium near *ds*. Moveable finger approximately same length as hand; hand constricted distally; moveable chelal finger with large basal apodeme. Chelicera with 5 setae on hand, *bs* lanceolate, remainder acuminate; flagellum of 8 blades; moveable finger with 1 seta; galeal region a very low elevation. Carapace (Fig. 33) 0.87 times as long as broad; 4 corneate eyes; epistome very low, with 2 closely appressed setae; with 4: 4: 4: 2: 2 setae. Tergites and sternites undivided. Tergal chaetotaxy: 4: 4: 4: 4: 5: 7: 6: 6: 5: 4: 4: 0. Sternal chaetotaxy: 10: (4)8(4): (3)6(3): 10: 10: 11: 11: 11: 9: 0: 2. Coxal chaetotaxy: 3: 4cs: 5: 5; coxae II with 8 distally incised spines set in oblique row; intercoxal tubercle absent. Genital opercula not unusual. Female genitalia (Fig. 34) with rounded lateral apodeme frame, the base of which appears to possess muscle attachment sites; lateral diverticula moderately large with lateral cribriform plate on posterior half; posterior diverticulum moderately large. Spiracles with stigmatic helix. Legs: heterotarsate, arolium slightly shorter than claws; claws simple.

Dimensions (mm): body length 1.13; pedipalps: trochanter 0.18/0.10, femur 0.535–0.545/0.095, tibia ??, chela 0.73–0.745/0.14, moveable finger length 0.36–0.375, hand length 0.36–0.37; chelicera 0.33/0.18, moveable finger length 0.20; carapace 0.345/0.395; leg I: trochanter 0.11/0.10, basifemur 0.295/0.065, telofemur 0.155/0.05, tibia 0.16/0.04, tarsus 0.305/0.035; leg IV: trochanter ??, basifemur 0.225/0.20, telofemur 0.33/0.185, tibia 0.32/0.07, basitarsus 0.15/0.055, telotarsus 0.34/0.035.

*Etymology.* The specific epithet is for Prof. I.W.B. Thornton, leader of the La Trobe University Krakatau Expeditions.

*Remarks.* The lanceolate form of both the spine-like chelal seta and cheliceral seta *bs* are unique.

### *Lagynochthonius hamatus* sp. nov.

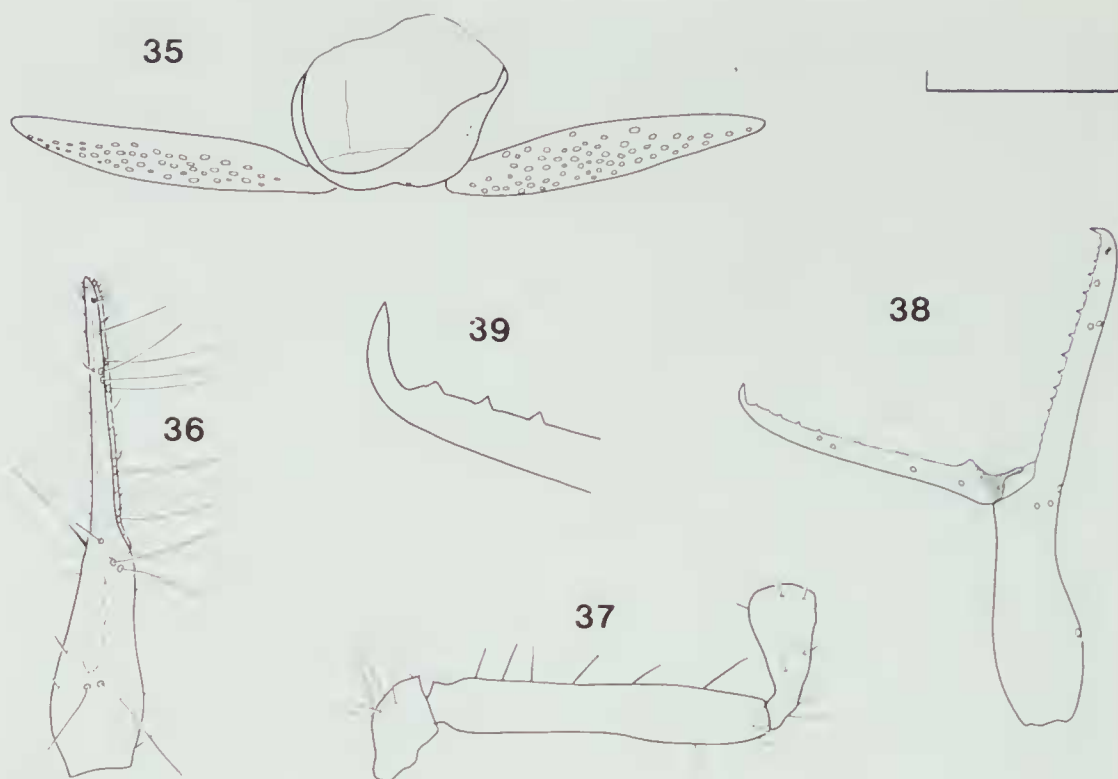
Figures 34–39

*Type material.* Holotype ♀, 7.5 km W of Liwa, Sumatra, 5°04'S, 104°03'E, 730 m, litter, 1 Sep 1984 (MZB, 91-M, MH807.14, SL).

Paratypes: 1 ♀ (without pedipalps), 1 tritonymph, same data as holotype (♀ in NMV, K743, tritonymph in MZB, 91-M, MH807.15–16, SL).

*Diagnosis.* This is the only species of the genus with a distinctly hooked terminal tooth of the moveable chelal finger.

*Description.* Female only. Colour pale yellow-brown, pedipalps and carapace slightly darker. Setae acuminate. Pleural membrane finely papillate. Pedipalp (Figs 36, 37): trochanter 1.71, femur 5.64, tibia 2.20, chela 5.65, hand 2.40 times as long as broad. Fixed chelal finger and hand with 8 trichobothria, moveable chelal finger with 4 trichobothria; *ib* and *isb* on dorsum of hand, *st* close to *t* (Fig. 38). Hand with 1 medial spine-like seta at level of *ist*. Venom apparatus absent. Chelal teeth: fixed finger with 15 large, well-spaced, slightly retrorse teeth, plus 5 small intercalary teeth between anterior teeth; moveable finger with 6 well-spaced teeth in anterior half, seventh tooth rounded, remaining teeth low and rounded; distal end of moveable finger with hooked terminal tooth (Fig. 39). Fixed finger without distal sensorium near *ds*. Moveable finger longer than hand; hand constricted distally; moveable chelal finger with large basal apodeme. Chelicera with 5 setae on hand, all acuminate; flagellum of 7 blades; moveable finger with 1 seta; galeal region a low elevation. Carapace 0.98 times as long as broad; 4 eyes, anterior pair corneate, posterior pair represented by faint eye spots; epistome very low, with 2 closely appressed setae; with 4: 4: 4: 2: 2 setae. Tergites and sternites undivided. Tergal chaetotaxy: 4: 4–5: 5–6: 5–6: 6: 6: 7: 6: 4: 4: 0. Sternal chaetotaxy: 10–11: (4)10–14(4): (4)9–11(4): 9–10: 10–11: 10: 11: 9–10: 9: ? : 2. Coxal chaetotaxy: 3–4: 4cs: 5: 5; coxae II with 7 distally incised spines set in oblique row; intercoxal tubercle absent. Genital opercula not unusual. Female genitalia (Fig. 35) with thickened lateral apodeme frame; lateral diverticulum ovoid, nearly completely covered with lateral cribriform plates. Spiracles with stigmatic helix. Legs: heter-



Figures 35-39. *Lagynochthonius hamatus* sp. nov., holotype female. Fig. 35, genitalia, ventral. Fig. 36, right chela, dorsal. Fig. 37, trochanter, femur and tibia of right pedipalp, dorsal. Fig. 38, left chela, lateral. Fig. 39, distal end of moveable finger of left chela, lateral. Scale line = 0.06 mm (figs 35, 39), 0.20 mm (figs 36-38).

otarsate; arolium slightly shorter than claws; claws simple.

Dimensions (mm): body length 0.87; pedipalps: trochanter 0.12/0.07, femur 0.395/0.07, tibia 0.16/0.075, chela 0.565/0.10, moveable finger length 0.315, hand length 0.24; chelicera 0.25/0.13, moveable finger length 0.14; carapace 0.275/0.28; leg I: trochanter 0.08/0.075, basifemur 0.205/0.045, telofemur ??, tibia 0.12/0.03, tarsus 0.225/0.025; leg IV: trochanter 0.13/0.09, basifemur 0.16/0.145, telofemur 0.25/0.14, tibia 0.235/0.055, basitarsus 0.11/0.045, telotarsus 0.25/0.03.

Tritonymph: Colour much paler than adults. Pedipalp: femur 5.30, chela 6.08, hand 2.77 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria; *isb* and *sb* absent. Fixed chelal finger with 13 teeth, plus 2 small intercalary teeth distally. Chelicera with 5 setae on hand; flagellum of 7 pinnate blades. Carapace 1.00 times as long as broad; with 16 setae, including 4 on anterior margin and 2 on posterior margin. Tergal chaetotaxy: 4: 4: 4: 5: 5: 5: 5: 5: 5: 4: 4: 0. Sternal chaetotaxy: 5:

(?)6(?): (1)6(1): 8 : 7: 7: 8: 7: 7: 2: 2. Coxal chaetotaxy: 3: 3es: 4: 4; coxae II with 5 distally incised spines. Heterotarsate.

Dimensions (mm): body length 0.70; pedipalps: femur 0.265/0.05, chela 0.395/0.065, moveable finger length 0.22, hand length 0.18; carapace 0.225/0.225.

*Etymology.* The specific epithet refers to the hooked nature of the terminal tooth of the moveable chelal finger (Latin *hamatus*, hooked).

### Garypidae

#### Garypus L. Koch

#### *Garypus maldivensis* Pocock

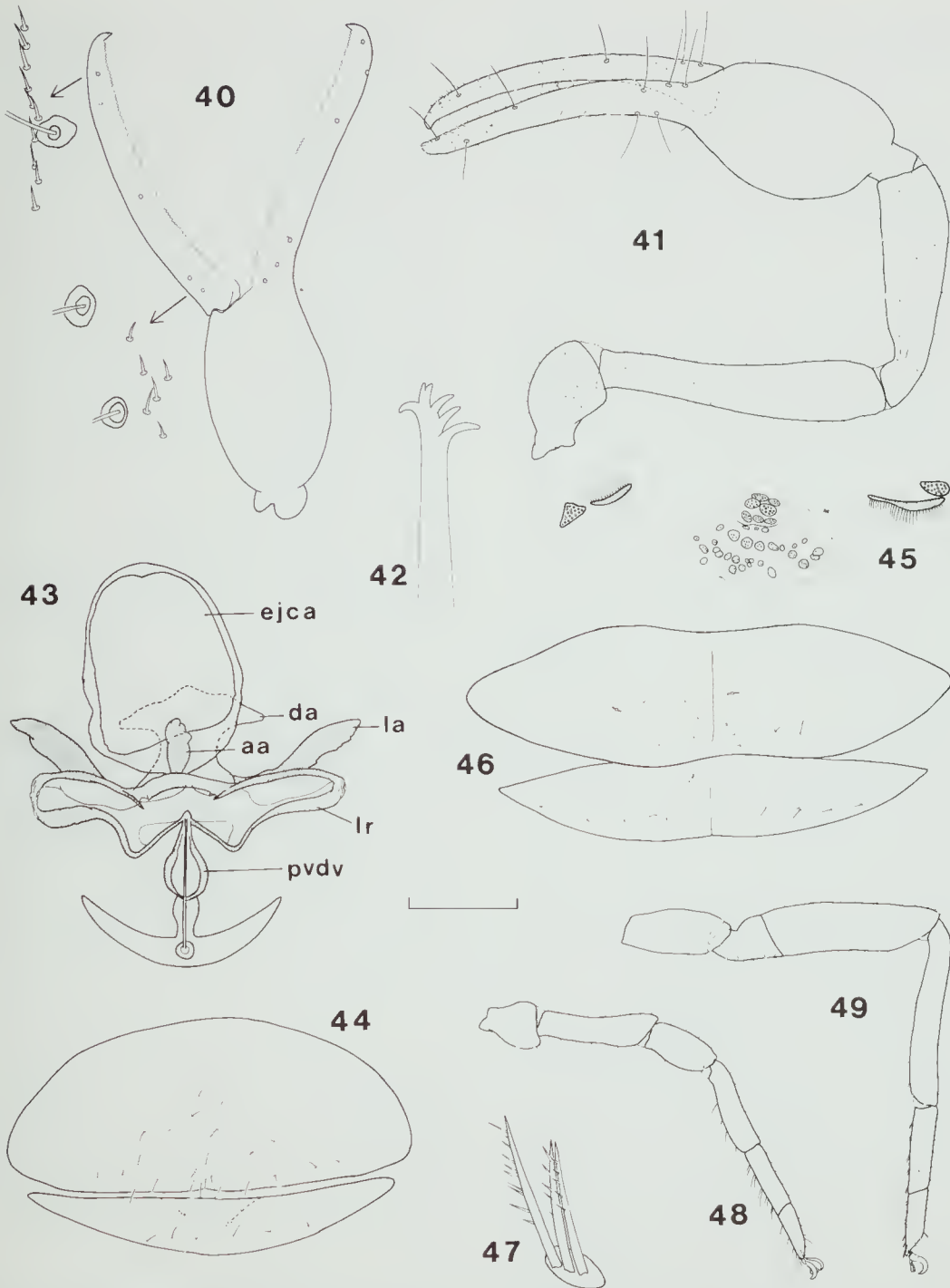
Figures 40-49

*Garypus maldivensis* Pocock, 1904: 798-799, figs 1a-e. — Chamberlin, 1930: 613, figs 1s, 1z. — Beier, 1932b: 222. — Beier, 1973: 45. — Mahner, 1982: 310, fig. 9.

*Type material.* Lectotype ♀ [designated by Chamberlin (1930: 613); see below], Midu Atoll, Maldive Islands (BMNH, 1924.11.3.44, JC-516.01001-3, SL).

Paralectotypes: 2 ♀, same data as lectotype (BMNH,





Figures 40-49. *Garypus maldivensis* Pocock. Figs 40-42, 45-49, female, MH827.02. Figs 43-44, male, MH827.01. Fig. 40, left chela, lateral, with detail of microsetae on moveable finger. Fig. 41, right pedipalp, dorsal. Fig. 42, galea. Fig. 43, genitalia, ventral. Fig. 44, genital opercula, ventral. Fig. 45, genitalia, ventral. Fig. 46, genital opercula, ventral. Fig. 47, flagellum. Fig. 48, left leg I. Fig. 49, left leg IV. Scale line = 0.66 mm (figs 40-41, 48-49), 0.07 mm (figs 42, 47), 0.10 mm (fig. 43), 0.17 mm (figs 44-45), 0.20 mm (fig. 46).

1924.11.3.46, 48, JC-516.01002-3, SL and SP).

*Other material examined.* Krakatau Islands, Rakata, Zwarte Hoek, 6°09'S, 105°25'E, under bark of dead *Barringtonia asiatica* on beach, 15 Sep 1984, 1 ♀, 1 ♂ (♀ in ZMB, ♂ in NMV, 172-M, MH827.01-02, SL).

*Diagnosis.* Without a complete revision of the Asian and Australian species assigned to this genus, it is impossible to distinguish *G. maldivensis* satisfactorily from other described species (see *Remarks* below).

*Description.* Colour: chela dark red-brown, remainder of pedipalps, carapace and tergites yellow-brown. Setae acarinate, generally acicular and straight, those of tergites, carapace and pedipalps often thicker and slightly curved. Pleural membrane wrinkled pliate, lacking investing setae. Pedipalp (Fig. 41) elongate: trochanter 1.73–1.83 (♂), 1.64–1.72 (♀), femur 4.96–5.15 (♂), 4.42–4.85 (♀), tibia 4.00 (♂), 3.44–3.74 (♀), chela (with pedicel) 4.60 (♂), 3.60–3.87 (♀), chela (without pedicel) 4.36 (♂), 3.41–3.66 (♀), hand 1.72 (♂), 1.41–1.43 (♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb*, *esh* and *ist* in straight row, virtually equidistant, *ib* and *ist* adjacent, with *ib* dorsal to *ist*, *est*, *it* and *et* in distal third of finger, *it* closer to *et* than to *est*, *b* and *sb* basal, *st* slightly closer to *sb* than to *t*; patch of 6 lanceolate setae situated near *b*, and 10 near *t* (Fig. 40). Venom apparatus present in both fingers, terminating in nodus ramosus near *it* in fixed finger and proximal to *t* in moveable finger. Chelal teeth numerous, closely spaced and slightly retrorse. Chelicera with 5 setae on hand, all acuminate; scerula exterior with 26 (♂), 27–28 (♀) blades; flagellum of three blades, all with accessory spinules (Fig. 47); moveable finger with 1 seta; galea of male bifid, of female long with 5–6 distal rami (Fig. 42). Carapace 1.37 (♂), 0.96–1.08 (♀) times as long as broad; 2 transverse furrows present, anterior furrow very shallow; 4 eyes on ocular tubercles, posterior pair slightly smaller than anterior pair. Tergites II–X and sternites IV–X with broad division. Tergal chaetotaxy: ♂, 10: 11: 11: 12: 13: 14: 13: 15: 16: 16: 9: 2; ♀, 8–10: 13: 13–15: 12–14: 14–15: 15–22: 16–18: 16–18: 18–19: 15–16: 8–10: 2. Sternal chaetotaxy: ♂, 23: (0)7 [21] (0): (0)9(0): 10: 14: 15: 12: 12: 5: 4: 2; ♀, 10–14: (0)7–8(0): (0)7–12(0): 11–13: 14–20: 16–17: 15–17: 14–17: 11–14: 8–10: 2. Coxal chaetotaxy: ♂, 7–8: 9–10: 10: 18; ♀, 8–11: 11–12: 11–15: 20–28. Coxa IV wider than coxa I. Male genital opercula (Fig. 44): anterior operculum with very faint medial suture, posterior operculum narrow. Female genital oper-

cula (Fig. 46) with incomplete, very faint medial sutures. Male genitalia (Fig. 43): lateral apodeme wing-shaped; anterior apodeme lobed; dorsal apodeme large; lateral rod moderately thin, ejaculatory atrium large. Female genitalia (Fig. 45): median cribriform plate apparently of 1 large plate with many fragmented regions of pores; muscle attachment plates present; spermathecae absent. Spiracles lacking stigmatic helix. Legs (Figs 48, 49): basifemur of legs I and II much longer than telofemur; diplotarsate, division between basitarsus and telotarsus slightly oblique; arolium shorter than claws; claws simple. Anal plate completely surrounded by sternite XI.

Dimensions (mm), ♂ (♀): body length 3.81 (5.19–5.77); pedipalps: trochanter 0.57–0.585/0.32–0.33 (0.715–0.79/0.435–0.48), femur 1.365–1.415/0.275 (1.68–1.875/0.375–0.395), tibia 1.18/0.295 (1.46–1.56/0.40–0.44), chela (with pedicel) 2.30/0.50 (2.95–3.10/0.78–0.82), chela (without pedicel) 2.18 (2.80–3.00), moveable finger length 1.29 (1.81–1.96), hand length 0.86 (1.10–1.175); chelicera 0.395/0.19 (0.565–0.58/0.265–0.275), moveable finger length 0.275 (0.385–0.40); carapace 1.12/0.815 (1.445–1.555/1.335–1.62), cucullus length 0.21 (0.21–0.32), ocular breadth 0.665 (0.84–0.925), anterior eye 0.12 (0.16–0.175), posterior eye 0.10 (0.125–0.15); leg I: trochanter 0.265/0.21 (0.385–0.415/0.28–0.315), basifemur 0.57/0.165 (0.70–0.735/0.205–0.225), telofemur 0.35/0.165 (0.45–0.495/0.21–0.23), tibia 0.445/0.12 (0.58–0.645/0.145–0.155), basitarsus 0.34/0.09 (0.445–0.455/0.11–0.13), telotarsus 0.315/0.09 (0.335–0.385/0.105–0.115); leg IV: trochanter 0.405/0.20 (0.63–0.67/0.265–0.305), basifemur 0.31/0.19 (0.445–0.47/0.235–0.265), telofemur 0.685/0.205 (1.07–1.19/0.28–0.305), tibia 0.685/0.135 (1.11–1.175/0.16–0.17), basitarsus 0.385/0.105 (0.565–0.58/0.135–0.145), telotarsus 0.32/0.095 (0.42–0.45/0.12–0.135).

*Remarks.* Pocock (1904) did not designate a holotype for *Garypus maldivensis* in the original description, but Chamberlin (1930), having examined the type specimens, nominated one as the holotype. As there is no reason to suppose that Pocock regarded this specimen as the holotype, it must be regarded as a lectotypic designation (Article 74b, International Code of Zoological Nomenclature, third edition).

There appears to be a certain amount of confusion regarding the classification of the Asian and Australian species of *Garypus*, mainly due to the small sample sizes (only *G. japonicus* Beier appears to have been collected on a frequent basis). Most

species have been distinguished on the relative sizes of the palpal segments, but until detailed work such as that by Wagenaar Hummelinck (1948) and Lee (1979) is completed, identifications must remain tentative. Nevertheless, the pair from Rakata are very similar to the types of *G. maldivensis* and are undoubtedly conspecific. The detailed structure of the male genitalia may serve to adequately distinguish species, but the only other figure of a *Garypus* species is that of *G. beauvoisii* (Audouin) by Vachon (1938, fig. 40) which is radically different to that of *G. maldivensis*.

Due to the presence of spinose flagellar blades, microsetae dorsal to *b*, only slightly oblique tarsal divisions and the absence of investing setae from the pleural membrane, *Garypus maldivensis* belongs to the "giganteus" species-group as defined by Lee (1979).

This species has only been found on Midu Atoll, Sri Lanka and now, Krakatau.

### Geogarypidae

#### Geogarypus Chamberlin

#### *Geogarypus javanus* (Tullgren)

Figures 50-54

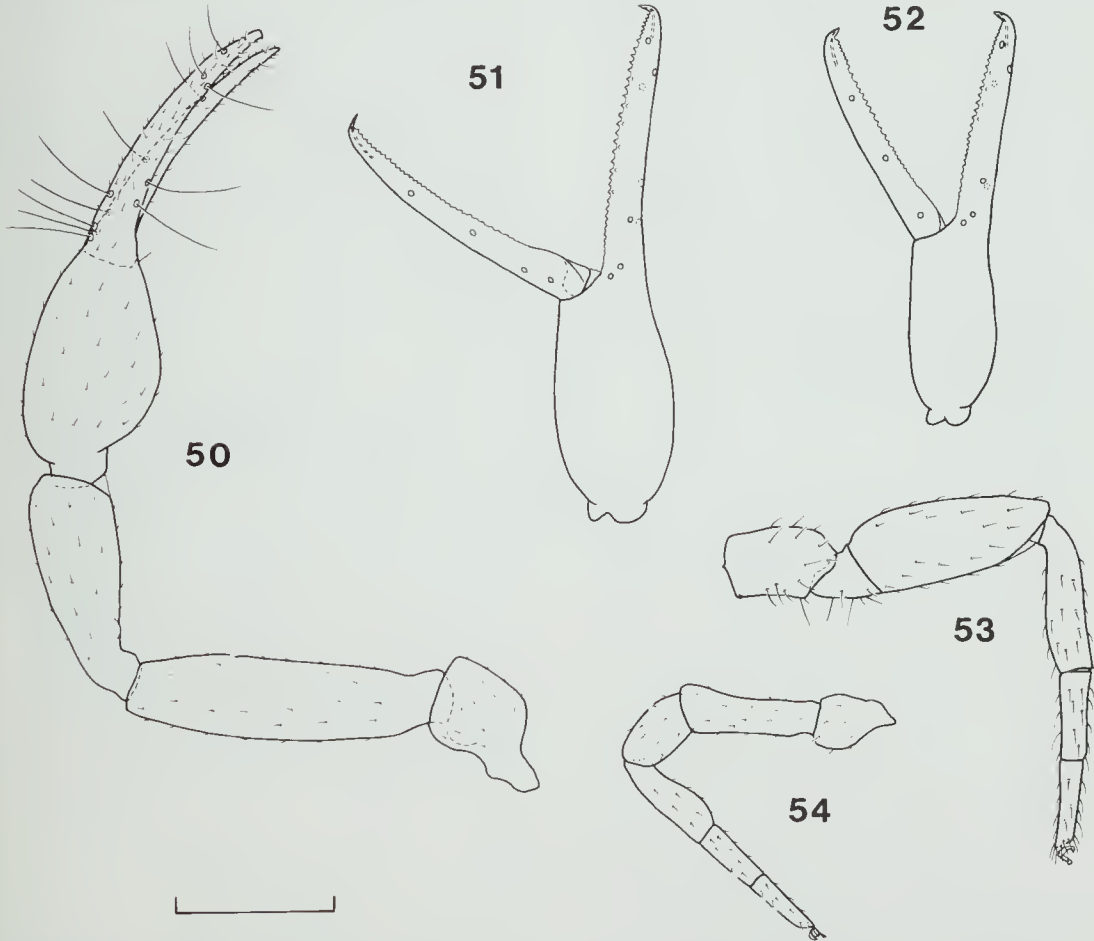
*Garypus javanus* Tullgren, 1905: 43-44. — Tullgren, 1907: 66. — Ellingsen, 1910: 388.

*Geogarypus formosanus* Beier, 1931: 315-316, fig. 10. Syn. nov.

*Geogarypus (G.) formosanus*. — Beier, 1932b: 232-233, fig. 260.

*Geogarypus (G.) javanus*. — Beier, 1932b: 233-234, fig. 261.

*Geogarypus audyi* Beier, 1952: 103-105, fig. 6. Syn. nov.



Figures 50-54. *Geogarypus javanus* (Tullgren). Figs 50, 54, holotype male. Figs 51, 53, male, MH813.01. Fig. 52, tritonymph, MH823.02. Fig. 50, left pedipalp, dorsal. Fig. 51, left chela, lateral. Fig. 52, left chela, lateral. Fig. 53, left leg IV. Fig. 54, left leg I. Scale line = 0.28 mm (fig. 50), 0.25 mm (figs 51-54).

*Geogarypus javanus*. — Beier, 1953: 82. — Weidner, 1959: 115. — Morikawa, 1963: 6–7. — Beier, 1982: 43.

*Geogarypus (G.) javanus formosanus*. — Beier, 1957: 21–24, figs 9a–b, 10a–d, 11a–d, 12e–f.

*Geogarypus (G.) javanus audyi*. — Beier, 1957: 25 (key).

*Geogarypus (G.) javanus javanus*. — Beier, 1957: 25 (key).

*Geogarypus (G.) elegans audyi*. — Beier, 1963: 507–508.

*Geogarypus javanus javanus*. — Beier, 1965: 764. — Beier. — 1966a: 140. — Beier, 1970: 318.

*Geogarypus (G.) javanus takensis* Beier, 1967: 352, fig. 12. Syn. nov.

*Types. Garypus javanus*: holotype male, Buitenzorg [now Bogor], Java, Farndetrutus, Mar 1904 (ZMH, SP).

*Geogarypus formosanus*: holotype ♂, Takao [now Kaohsiung], Formosa [now Taiwan], 27 Jan 1907, H. Sauter (ZMB, SP).

*Geogarypus audyi*: holotype ♂, Kuala Lumpur, Malaysia, in nest of *Rattus rattus thardi* (Jentink) [the label, in Beier's handwriting, indicates *Rattus rattus* as the host] (Muridae: Rodentia), 8 Dec 1949, [J.R.] Audy (NHMW, SP).

*Geogarypus javanus takensis*: holotype ♂, Langs weg var Tak noar Thoen, 65 km var. Tak, Thailand, 5 Dec 1957, L.D. Brongersma (RMNH, no. 312, SP).

*Other material examined.* Krakatau Islands, Rakata, Zwarte Hoek, 6°09'S, 105°25'E, 31 Aug 1984, 1 tritonymph (MZB, 104.8B, MH823.02, SI). Sertung, spit, 6°04'S, 105°24'–25'E, beating in transition zone, 18 Aug 1985, 1 ♂ (MZB, 244-BI., MH863.01, SI). Java, Ujung Kulon, Pulau Peucang, 6°45'S, 105°15'E, beating, rainforest, 19 Sep 1984, 1 ♂, 1 ♀ (NMV, 179-G, MH813.01-02, SI); same data except beating *Pandanus* sp., 1 ♀ (MZB, 179-Y, MH812.01, SI).

*Diagnosis.* The small size and uniform colour of the pedipalps distinguishes this species from its congeners.

*Description.* Adults: anterior portion of carapace dark brown, remaining area white; all pedipalpal segments brown. Pedipalp (Fig. 50): trochanter 1.45–1.65 (♂), 1.50–1.75 (♀), femur 3.32–3.56 (♂), 4.16–4.27 (♀), tibia 2.54–3.07 (♂), 2.79–2.91 (♀), chela (with pedicel) 3.58–3.92 (♂), 3.85–3.87 (♀), chela (without pedicel) 3.48–3.79 (♂), 3.72–3.75 (♀), hand 1.61 (♂), 1.64–1.65 (♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb* and *esh* basal, *est* adjacent to *ib*, *st* midway between *sb* and *t* (Fig. 51). External face of fixed finger with 2 pit-like structures with raised rims below *esh* and *est*. Venom apparatus present in both chelal fingers; nodus ramosus distal. Fixed chelal finger with 33 (♂), 30 (♀) slightly curved marginal teeth, and 6 (♂), 10 (♀) internal accessory teeth; moveable chelal finger with 33 (♂), 36 (♀) marginal teeth. Chelicera with 5 setae on hand;

serrula exterior with 16 (♂, ♀) lamellae; flagellum of 1 short aspinose blade; moveable finger with 1 distal seta; galea simple, with no rami. Carapace with 9–12 (♂), 12 (♀) setae on posterior margin, 0.86–0.97 (♂), 0.82–0.87 (♀) times as long as broad; 4 corneate eyes, approximately of similar size. Tergites and sternites not divided, but median sternites with very faint suture lines. Tergal chaetotaxy: ♂, 9–12: 10–13: 11: 10–12: 11–12: 12: 12–13: 13–14: 11–12: 6–9: 6–8: 2; ♀, 10–11: 11: 11–12: 11–13: 11–14: 3: 14: 12–13: 10–12: 8–9: 6–8: 2. Sternal chaetotaxy: ♂, 10–13: (1)4–11 [2–4] (1): (0)4(1): 12: 14–16: 13–16: 14–16: 11–12: 6–10: 2: 0; ♀, 8: (1)2–3(1): (1)2–4(1): 8–10: 13–14: 12–14: 14–15: 10–12: 7–8: 2: 0. Coxal chaetotaxy: ♂, 6–8: 9–11: 15–17: 23–24; ♀, 9: 10–14: 17–19: 36–38. Genital opercula similar to those of *G. taylori* Harvey (Harvey, 1986, figs 11, 13). Male genitalia as in *G. taylori* (Harvey, 1986, fig. 12). Female genitalia: lateral cribriform plates elongate, 1 median cribriform plate. Spiracles with stigmatic helix. Legs (Figs 53–54): diplotarsate; basifemur of legs I and II longer than telofemur; arolium longer than claws; claws simple.

Dimensions (mm), ♂ (♀): body length 1.35–1.62 (1.83–1.91); pedipalps: trochanter 0.22–0.26/0.15–0.17 (0.28–0.285/0.16–0.19), femur 0.465–0.615/0.135–0.15 (0.645–0.705/0.155–0.165), tibia 0.355–0.445/0.14–0.16 (0.46–0.495/0.165–0.17), chela (with pedicel) 0.825–0.94/0.23–0.25 (1.04–1.065/0.27–0.275), chela (without pedicel) 0.80–0.91 (1.005–1.03), moveable finger length 0.47–0.55 (0.59–0.605), hand length 0.37 (0.445–0.45); chelicera 0.155–0.16/0.08–0.09 (0.095–0.10/0.095–0.10), moveable finger length 0.10–0.11 (0.115–0.12); carapace 0.50–0.575/0.515–0.625 (0.575–0.60/0.66–0.73), cucullus length 0.13–0.135 (0.15–0.17), ocular breadth 0.34–0.36 (0.37–0.385), anterior eye 0.05–0.075 (0.065), posterior eye 0.045–0.05 (0.06); leg I: trochanter 0.13–0.145/0.105–0.115 (0.155/0.125–0.135), basifemur 0.255–0.275/0.09–0.095 (0.30–0.325/0.105), telofemur 0.155–0.16/0.09 (0.18–0.185/0.095), tibia 0.185–0.205/0.06–0.065 (0.225/0.07), basitarsus 0.12–0.145/0.05 (0.16/0.05–0.055), telotarsus 0.13–0.145/0.04 (0.14/0.035–0.045); leg IV: trochanter 0.20/0.115 (0.24–0.255/0.13–0.14), basifemur 0.125/0.09 (0.155–0.16/0.10–0.105), telofemur 0.35/0.135 (0.43–0.45/0.155–0.16), tibia 0.285/0.075 (0.345/0.085–0.09), basitarsus 0.155/0.055 (0.19–0.195/0.06–0.065), telotarsus 0.155/0.045 (0.18–0.185/0.045–0.05).

Tritonymph: colour pale, but all pedipalpal segments brown. Pedipalp: trochanter 1.60, femur

3.95, tibia 2.74, chela (with pedicel) 4.21, chela (without pedicel) 4.06, hand 1.76 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria; *isb* and *sb* absent (Fig. 52). Serrula exterior of chelicera with 13 lamellae; galea long with 5 distal to subdistal rami. Carapace with 7 setae on posterior margin; 0.86 times as long as broad. Tergal chaetotaxy: 8: 7: 8: 9: 8: 8: 8: 8: 7: 6: 6: 2. Sternal chaetotaxy: 2: (1)2(1): (1)3(1): 8: 8: 8: 9: 6: 6: 2: 0. Coxal chaetotaxy: 5: 7: 9: 16. Diplotarsate.

Dimensions (mm): body length 1.18; pedipalps: trochanter 0.20/0.125, femur 0.435/0.11, tibia 0.315/0.115, chela (with pedicel) 0.695/0.165, chela (without pedicel) 0.67, moveable finger length 0.405, hand length 0.29; carapace 0.43/0.50.

*Remarks.* The type material of *Garypus javanus*, *Geogarypus formosanus*, *G. audyi* and *G. javanus takensis* have been examined and there can be no doubt that they are all conspecific. The male holotypes of the three former species are virtually identical in size; the holotype of *G. javanus takensis* is slightly smaller, but well within the range usually accorded to species. The male from Ujung Kulon is intermediate in size between the latter and the other three holotypes. I can detect no consistent characters that would warrant the maintenance of separate species or subspecies, and therefore reduce to synonymy the three later names. The male holotype of *G. javanus* was incorrectly considered by Tullgren (1905) to be a juvenile.

*Geogarypus micronesiensis* Morikawa was described from a single female from Mareus Island (Morikawa, 1952) and bears a striking resemblance to *G. javanus*. It is of similar size (Morikawa reports a femur length of 0.66 mm) and were it not for a differently coloured carapace (Morikawa, 1952, fig. 4), I would consider them conspecific. Examination of the holotype is necessary before a definite decision can be made.

*Geogarypus javanus* is widely distributed in South-east Asia and has been recorded from the following countries: Thailand, Malaysia, Taiwan, Papua New Guinea (New Britain, Bismark-Archipelago), Indonesia (Java, West Sumba, Irian Jaya), Solomon Islands, and many islands in Micronesia.

### *Geogarypus albus* Beier

Figures 55–58

*Geogarypus albus* Beier, 1963: 508–510, fig. 1.—Tenorio and Muehmore, 1982: 382.

*Type material.* Holotype ♂, Rantau Panjang, 8 km N of Klang, Selangor, Malaysia, ex nest no. 65 of

*Microscelis olivacea* Blyth (Pycnonotidae: Aves), 1960, H.E. McClure and Lim Boo-Liat (BPBM, 3464, not examined). Allotype ♀, same data as holotype except nest no. 62 (BPBM, not examined).

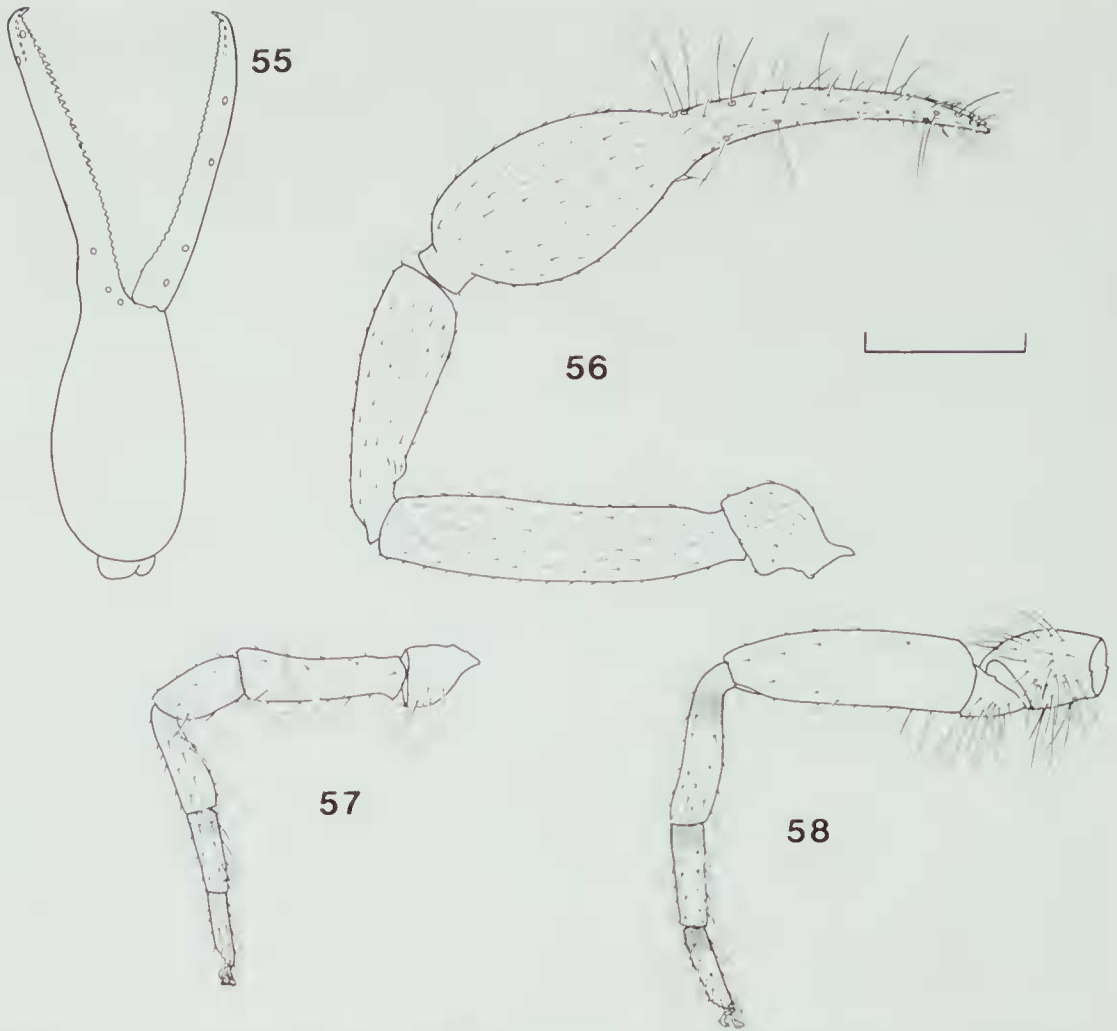
Paratypes: 1 ♀, same data as holotype except nest no. 26 (BPBM?, not examined); 1 ♂, same data as holotype except 22 Feb 1961, nest no. 69 (BPBM?, not examined); 1 ♂, same data as holotype except nest no. 111 (BPBM?, not examined); 1 ♀, 1 deutonymph, same data as holotype except nest no. 193 (BPBM?, not examined).

*Material examined.* Java. Ujung Kulon, Cibunar, 6°48'S, 105°17'E, litter, 20 Sep 1984, 1 ♀ (MZB, 18-B, MH817.01, SL).

*Diagnosis.* The large size and pale colour adequately distinguish this species.

*Description.* Female from Cibunar: colour as figured by Beier (1963); chela dark red-brown, remaining pedipalpal segments nearly white, even though some brown is apparent; legs banded as in Figs 57–58. Pedipalp (Fig. 56): trochanter 1.51, femur 4.66–4.78, tibia 3.18–3.24, chela (with pedicel) 3.96, chela (without pedicel) 3.81, hand 1.67 times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb* and *esb* basal, *est* slightly anterior to *ib*, *st* slightly closer to *t* than to *sb* (Fig. 55). External face of fixed finger with 18 pit-like structures with raised rims along face of finger. Venom apparatus present in both fingers; nodus ramosus distal. Fixed chelal finger with 36 well-spaced, slightly retrorse marginal teeth, plus 15 internal accessory teeth; moveable finger with 39 marginal teeth. Chelicera with 5 setae on hand; serrula exterior with 19–20 lamellae; flagellum of 1 aspinose blade; moveable finger with 1 distal seta; galea simple, with no rami. Carapace with 11 setae on posterior margin, 1.10 times as long as broad; 4 eyes, anterior pair slightly larger than posterior pair. Tergites and sternites not divided, but median sternites with a very faint suture line. Tergal chaetotaxy: 14: 14: 15: 18: 19: 20: 18: 16: 14: 12: 6: 2. Sternal chaetotaxy: 10: (2)2(2): (2)6(2): 16: 16: 15: 16: 16: 12: 2: 0. Coxal chaetotaxy: 8: 9: 16: 42. Genital opercula similar to those of *G. taylori* (Harvey, 1986, fig. 13). Female genitalia with elongate lateral cribriform plates and 1 rounded median cribriform plate. Spiracles with stigmatic helix. Legs (Figs 57, 58): diplotarsate; trochanter and basifemur of leg IV with many long setae; basifemur of legs I and II longer than telofemur; arolium longer than claws; claws simple.

Dimensions (mm): body length 2.67; pedipalps: trochanter 0.37/0.245, femur 0.955–0.98/0.205, tibia 0.715–0.73/0.225, chela (with pedicel) 1.485/0.375, chela (without pedicel) 1.43, movca-



Figures 55-58. *Geogarypus albus* Beier, female, MH1817.01. Fig. 55, right chela, lateral. Fig. 56, left pedipalp, dorsal. Fig. 57, left leg I. Fig. 58, left leg IV. Scale line = 0.40 mm.

ble finger length 0.83, hand length 0.625; chelicera 0.225/0.115, moveable finger length; carapace 0.92/0.84, cucullus length 0.21, ocular breadth 0.52, anterior eye 0.08, posterior eye 0.075; leg I: trochanter 0.21/0.16, basifemur 0.43/0.14, telofemur 0.245/0.135, tibia 0.30/0.095, basitarsus 0.225/0.08, telotarsus 0.195/0.055; leg IV: trochanter 0.34/0.19, basifemur 0.20/0.135, telofemur 0.635/0.20, tibia 0.44/0.11, basitarsus 0.275/0.09, telotarsus 0.245/0.06.

*Remarks.* Even though the specimen from Java is slightly larger than the types from Malaysia, it is identical in all other characters of importance, and are thus considered conspecific. Until now, *Geogarypus albus* has only been known from the

type locality in Malaysia.

**Olpiidae**

**Amblyolpium Simon**

***Amblyolpium bellum* Chamberlin**

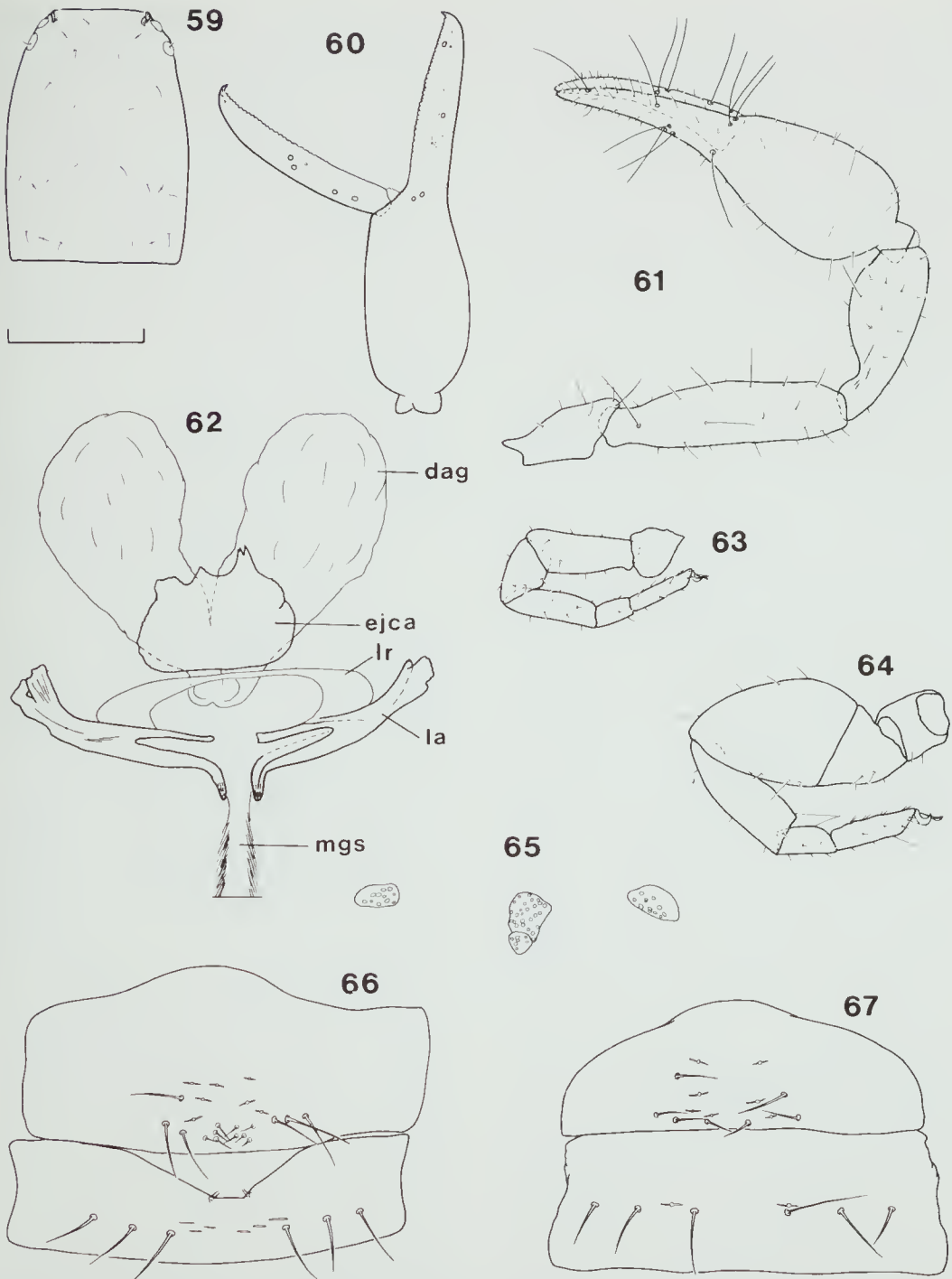
Figures 59-67

*Amblyolpium bellum* Chamberlin, 1930: 593-594. — Beier, 1932b: 204-205.

*Type material.* Holotype ♂, Banda [Kepulauan Banda, Maluku, 4°35'S, 129°55'E], Jun 1922, T. Mortensen (ZMC, JC-259.01001, SL).

Allotype ♀, Tjibodas [now Cibodas], Java, 20 Aug 1922, T. Mortensen (ZMC, JC-253.01001, SL).

*Other material examined.* Krakatau Islands. Rakata:



Figures 59-67. *Amblyolpium bellum* Chamberlin. Fig. 59, male, MH821.01. Figs 60, 61, 63, 64, female, MH821.06. Figs 62, 66 male, MH837.01. Fig. 65, female, MH821.04. Fig. 59, carapace, dorsal. Fig. 60, left chela, lateral. Fig. 61, right pedipalp, dorsal. Fig. 62, genitalia, ventral. Fig. 63, left leg I. Fig. 64, left leg IV. Fig. 65, genitalia, ventral. Fig. 66, genital opercula, ventral. Fig. 67, genital opercula, ventral. Scale line = 0.25 mm (figs 59-61, 63-64), 0.05 mm (fig. 62), 0.07 mm (fig. 65), 0.10 mm (figs 66-67).

Zwarte Hoek, 6°09'S, 105°25'E, under bark of *Ficus* sp., 12 Sep 1984, 3 ♂, 3 ♀ (2 ♂, 2 ♀ in NMV, remainder in MZB, 121-Y, MH821.01-06, SI); Owl Bay, 6°09'S, 105°28'E, under log, 26 Aug 1985, 1 ♂ (MZB, 227-IE, MH837.01, SI). Panjang, 6°05'S, 105°28'E: under bark of *Timonius compressicaulis*, 14 Sep 1984, 2 ♂, 3 ♀ (1 ♂, 1 ♀ in ANIC, remainder in MZB, 172-J, M11862.01-05, SP); under bark, 17 Aug 1985, 1 ♀ (MZB, 237-JI, MH868.01, SI).

**Diagnosis.** On the basis of the size and relative thickness of the pedipalpal segments (especially the chela), *A. bellum* most closely resembles *A. novae-guineae* Beier. On the basis of the description of the latter by Beier (1971), the two cannot be distinguished.

**Description.** Colour tan, carapace, pedipalps and tergites slightly darker than sternites and legs. Derm smooth. Pleural membrane longitudinally striate. Pedipalp (Fig. 61): trochanter 2.14-2.47 (♂), 2.09-2.32 (♀), femur with 2 dorsal tactile setae, 3.96-4.22 (♂), 3.40-4.41 (♀), tibia 2.29-2.64 (♂), 2.24-2.59 (♀), chela (with pedicel) 3.70-3.76 (♂), 3.31-3.82 (♀), chela (without pedicel) 3.49-3.53 (♂), 3.18-3.61 (♀), hand 1.59-1.76 (♂), 1.52-1.79 (♀) times as long as broad; hand as long as fingers. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb* and *esb* adjacent, *est* slightly closer to *et* than to *esb*, *ib* anterior to *esb*, *isb*, *ist* and it adjacent, *ist* slightly closer to *it* than to *isb*, *t* and *st* separated by only 2 areolar diameters (Fig. 60). Venom apparatus present in both chelal fingers; venom ducts very long, nodus ramosus near *isb* in fixed finger and basal to *st* in moveable finger. Fixed chelal finger with 33-36 (♂), 34-42 (♀) blunt marginal teeth; moveable finger with 19-22 (♂), 18-24 (♀) blunt marginal teeth. Chelicera with 5 acuminate setae on hand, *ls* and *is* the longest; serrula exterior with 17-18 (♂), 16-18 (♀) lamellae; lamina exterior of chelicera absent; flagellum of 4 blades, posterior blade slightly shorter than others, anterior blade with several spinules on anterior face; moveable finger with 1 distal seta; galea with 2 distal and 1 medial rami, not sexually dimorphic. Carapace (Fig. 59) with 4 (♂, ♀) setae on posterior margin, 1.42-1.53 (♂), 1.29-1.55 (♀) times as long as broad; 4 corneate eyes, anterior eye slightly larger than posterior eye. Tergites II-X and sternites V-X divided. Tergal chaetotaxy: ♂, 4-6: 4: 6: 6: 6-7: 6-8: 7-8: 6-8: 8-9: 10-12: 6: 2; ♀, 4-5: 4-6: 6: 6: 6-8: 6-8: 7-8: 7-9: 10-12: 6-8: 2. Sternal chaetotaxy: ♂, 11-16: (1)4-6 [4] (1): (1)7-8(1): 8-9: 8-11: 8-10: 8-10: 9-12: 11-12: 6: 2; ♀, 6-10: (1)6-7(1): (1)6-8(1): 8-10: 8-11: 8-10: 8-10: 10-12: 12-15: 6-8: 2. Sternites VI and VII with a pair of

slightly larger setae adjacent to midline. Coxal chaetotaxy: ♂, 8-9: 7-9: 4: 3-5; ♀, 6-9: 6-10: 4-5: 5. Male anterior genital operculum with 2 groups of small setae near posterior margin, plus several larger setae (Fig. 66). Female genital opercula (Fig. 67) not unusual. Male genitalia (Fig. 62) with incomplete lateral apodeme and complete lateral rod; dorsal anterior gland paired; median genital sac single. Female genitalia (Fig. 65) with elongate lateral cribriform plates and 2 irregularly ovoid median cribriform plates, 1 slightly smaller than the other. Spiracles with barely visible stigmatic helix. Legs (Figs 63, 64): diplotarsate; basifemur of legs I and II much longer than telofemur, junction moveable; femur IV very deep; telotarsus twice as long as basitarsus; arolium much longer than claws; claws simple; arolium divided.

Dimensions (mm), ♂ (♀): body length 1.61-2.00 (1.88-2.20); pedipalps: trochanter 0.235-0.245 (0.095-0.11 (0.24-0.255/0.11-0.115)), femur 0.445-0.485/0.11-0.12 (0.48-0.56/0.11-0.165), tibia 0.32-0.37/0.14-0.145 (0.36-0.415/0.14-0.185), chela (with pedicel) 0.685-0.765/0.185-0.205 (0.725-0.935/0.19-0.28), chela (without pedicel) 0.645-0.715 (0.685-0.89), moveable finger length 0.325-0.40 (0.345-0.48), hand length 0.325-0.335 (0.34-0.425); chelicera 0.155-0.18/0.085-0.10 (0.165-0.19/0.085-0.11), moveable finger length 0.115-0.125 (0.11-0.13); carapace 0.54-0.59 (0.36-0.40 (0.535-0.625/0.345-0.485)), anterior eye 0.04-0.045 (0.04-0.045), posterior eye 0.03-0.035 (0.03-0.04); leg I: trochanter 0.10/0.085 (0.095-0.11/0.09-0.095), basifemur 0.20-0.21/0.075-0.08 (0.205-0.225/0.08-0.085), telofemur 0.105-0.115/0.075 (0.115-0.125 (0.08-0.085)), tibia 0.17-0.185 (0.055 (0.135-0.20 (0.055-0.06)), basitarsus 0.07-0.085/0.04 (0.075-0.085/0.04), telotarsus 0.125-0.14/0.03-0.035 (0.14-0.15/0.035); leg IV: trochanter 0.145-0.155/0.115 (0.165/0.12), basifemur 0.17-0.185/0.135-0.15 (0.18-0.185 (0.135-0.155)), telofemur 0.305-0.325/0.185-0.20 (0.305-0.345/0.18-0.215), tibia 0.26-0.28/0.095 (0.28-0.295/0.095-0.105), basitarsus 0.105-0.11/0.055 (0.105-0.12/0.055-0.06), telotarsus 0.165/0.045 (0.175-0.185/0.045-0.05).

**Remarks.** There is considerable variation in the size of the palpal segments in the specimens examined during this study. The holotype is slightly larger than the males from Krakatau, and the allotype is substantially larger than the females. In addition, the galea of the allotype lacks the medial ramus apparent in the remaining specimens. This suggests that the allotype may belong to a different species.



While there are several localities with the name "Banda" in Asia, Dr H. Enghoff (UZM) informed me (pers. comm.) that the holotype of this species was taken by Dr Mortensen on Kepulauan Banda in the Maluku group.

This species is known only from Kepulauan Banda, Cibodas and Krakatau.

### Beierolpium Heurtault

#### Beierolpium oceanicum (With)

Figures 68–78

*Olpium longiventer* L. Koch. — Pocock, 1898: 323 (mis-identification).

*Garypinus oceanicus* With, 1907: 77–79. — Kastner, 1927: 15.

*Horus oceanicus*. — Chamberlin, 1930: 600.

*Xenolpium oceanicum*. — Beier, 1932b: 202. — Beier, 1940: 168–169. — Beier, 1957: 16–17, fig. 6a.

*Xenolpium oceanicum oceanicum*. — Beier, 1957: 17.

*Xenolpium oceanicum palauense* Beier, 1957: 18, fig. 6b. Syn. nov.

*Xenolpium oceanicum reductum* Beier, 1957: 19, figs 6c, 7a–b. Syn. nov.

*Xenolpium oceanicum latum* Beier, 1957: 19–20, fig. 6d. Syn. nov.

*Beierolpium oceanicum*. — Heurtault, 1976: 67, fig. 4.

*Type material.* *Garypinus oceanicus*: lectotype ♂ (present designation), Funafuti, [W.J.] Sollas (BMNH, 1898.4.4.33, SP).

Paralectotypes: 1 ♂, 4 ♀, same data as lectotype (BMNH, 1898.4.4.34–39, SP).

*Xenolpium oceanicum palauense*: lectotype ♂ (present designation), Auluaptagel (Aurapushekaru), Palau Islands, Sep 1952, N.L.H. Krauss (USNM, Type No. 2263, SP).

Paralectotypes: 1 ♀, same data as lectotype (USNM, 2263, SP); 1 ♀, E. Ngatpang, Babelthuap, Palau Islands, 8 Dec 1952, J.L. Gressitt (USNM, 2263, SP); 1 ♀, Agr[ic]ultural Exp[er]imental Station, [Colonia, Ponape], on rotten food, Gressitt (USNM, 2263, SP); 2 ♀, 1 tritonymph, Okinawa, 7 Jun 1945, A.B. Hardcastle (USNM, 2263, SP); other syntypes from South Mariana Islands and Palau Islands are apparently lodged in BPBM and FMNH (Beier 1957) but have not been examined.

*Xenolpium oceanicum reductum*: lectotype ♂ (present designation), Hill 541, Kusaie, 165 m, beating, 23 Mar 1953, J.F.G. Clarke (USNM, Type No. 2252, SP).

Paralectotypes: 1 ♂, 7 ♀, 1 tritonymph, same data as lectotype (USNM, 2252, SP); 3 ♀, 1 tritonymph, 3 deutonymphs, 1 protonymph, Hill 541, Kusaie, 165 m, 1 Apr 1953, J.F.G. Clarke (USNM, 2252, SP); 1 ♀, 1 deutonymph, Mutumlik, Kusaie, 22 m, 1 Mar 1953, J.F.G. Clarke (USNM, 2252, SP); 2 ♀, 1 deutonymph, 4 protonymphs, Agric. Exper. Sta., Colonia, Ponape, woody compost, 17 Jan 1953, J.L. Gressitt (USNM, 2252, SP); other syntypes from Kusaie are apparently lodged in BPBM and FMNH (Beier 1957) but have not been examined.

*Xenolpium oceanicum latum*: holotype ♀, Lwejjap Island, Lae A., Marshall Islands, under rocks, dead

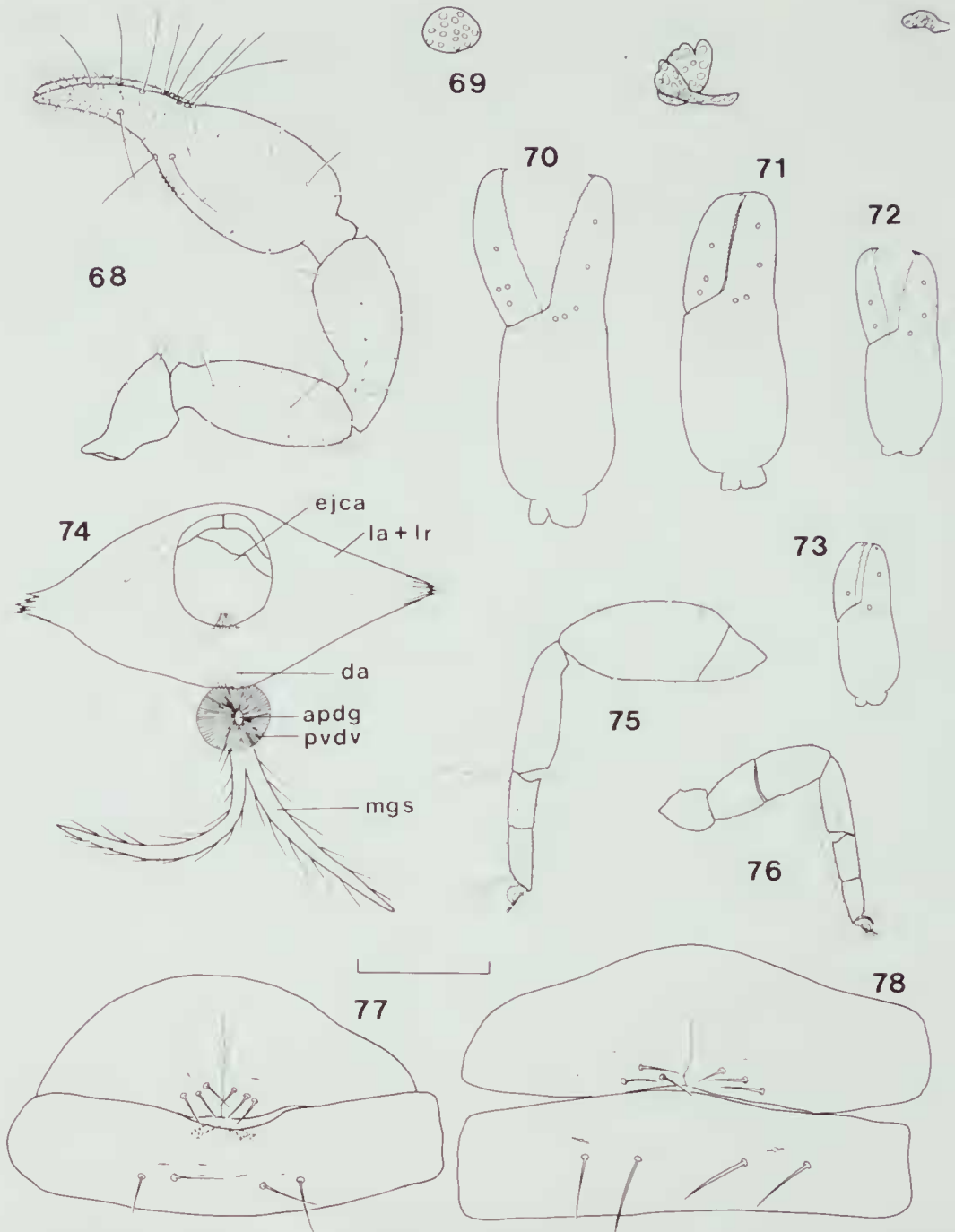
leaves, 9 Jan 1952, F.R. Fosberg (USNM, Type No. 2265, SP).

Paratypes: 1 tritonymph, Ebeju Island, Ujae A., Marshall Islands, 8 Mar 1952, F.R. Fosberg (USNM, 2265, SP); 1 protonymph, Elluk Island, Utirik A., Marshall Islands, 2 Dec 1951, F.R. Fosberg (USNM, 2265, SP).

*Other material examined.* Krakatau Islands. Rakata, Zwarte Hoek, 6°09'S, 105°25'E: under bark of *Barringtonia asiatica* on beach, 15 Sep 1984, 5 ♀ (2 ♀ in ANIC, remainder in MZB, 121-AU, MH826.01-05, SL); under rocks in bat cave, 15 Sep 1984, 1 tritonymph (MZB, 121-AS, MH825.01, SL). Sertung, spit, 6°04'S, 105°24'–25'E, *Casuarina equisetifolia* litter, 11 Sep 1984, 2 tritonymphs, 2 deutonymphs, 1 protonymph (MZB, 151-D, MH851.06-10, SL). Anak Krakatau, 6°06'S, 105°26'S, litter, 10 Sep 1984, 1 ♂, 1 tritonymph (MZB, 109-M, MH870.01-02, SL); litter of alang alang [*Imperata cylindrica* (L.) Beauv.], Aug 1985, 2 ♂, 2 ♀, 3 tritonymphs, 3 deutonymphs, 1 protonymph (1 ♂, 1 deutonymph in MZB, remainder in NMV, 216-AG, MH872.01-11, SL). Java. Ujung Kulon, Pulau Peucang, 6°45'S, 105°15'E, beating *Pandanus* sp., 19 Sep 1984, 1 ♀ (MZB, 179-Y, MH812.02, SL).

*Diagnosis.* *Beierolpium oceanicum* is smaller than *B. holmi* Mahnert, *B. kerioense* Mahnert, *B. lawrencei* (Beier) and *B. rossi* (Beier), and is larger than *B. clarum* (Beier). It most closely resembles *B. benoiti* Mahnert, from which it differs by its stouter chela, and *B. tanense* Mahnert, from which it differs by the more rounded chelal hand.

*Description.* Adults: pedipalps, tergites III–XI and most of carapace dark yellow-brown, tergites I–II and posterior portion of carapace white, sternites and legs slightly lighter. Derm smooth except for several small denticles on interior margin of chelal hand near base of fingers. Pleural membrane longitudinally striate. Pedipalp (Fig. 68): trochanter 1.68–1.96 (♂), 1.72–1.88 (♀), femur with two dorsal tactile setae, 2.44–2.78 (♂), 2.19–3.04 (♀), tibia 2.19–2.41 (♂), 1.97–2.56 (♀), chela (with pedicel) 2.82–3.02 (♂), 2.73–2.98 (♀), chela (without pedicel) 2.62–2.78 (♂), 2.50–2.72 (♀), hand 1.39–1.50 (♂), 1.35–1.47 (♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb*, *esb* and *isb* in straight line at base of fingers, *est* closer to *isb* than to *et*, *ib* and *ist* adjacent, basal, *it* anterior to *est*; *b*, *sb* and *st* basal, *sb* and *st* adjacent (Fig. 70). Venom apparatus present in both chelal fingers; venom ducts short, nodus ramosus distal. Fixed chelal finger with 24 (♂), 27–28 (♀) flattened marginal teeth; moveable finger with 26 (♂), 27–31 (♀) marginal teeth. Chelicera with 5 acuminate setae on hand, *bs* shorter than others; serrula exterior with 18 (♂, ♀) lamellae; lamina exterior of chelicera present; flagellum of 3 blades,



Figures 68-78. *Beierolpium oceanicum* (With). Figs 68-70, 75, 76, 78, female, MH826.02. Fig. 71, tritonymph, MH825.01. Fig. 72, deutonymph, MH872.08. Fig. 73, protonymph, MH872.11. Figs 74, 77, male, MH872.02. Fig. 68, right pedipalp, dorsal. Fig. 69, genitalia, ventral. Fig. 70, left chela, lateral. Fig. 71, left chela, lateral. Fig. 72, left chela, lateral. Fig. 73, left chela, lateral. Fig. 74, genitalia, ventral. Fig. 75, left leg IV (without trochanter). Fig. 76, left leg I. Fig. 77, genital opercula. Fig. 78, genital opercula. Scale line = 0.25 mm (figs 68, 70-73, 75-76), 0.10 mm (figs 69, 77-78), 0.05 mm (fig. 74).

anterior blade longer and stouter than others, without spinules; moveable finger with 1 distal seta; galea of male simple, without rami, of female long with 3 distal rami. Carapace with 6-8 setae on median section, 2 setae on posterior margin, 1.17-1.30 ( $\sigma$ ), 0.98-1.13 ( $\varphi$ ) times as long as broad; 4 corneate eyes, anterior eye slightly larger than posterior eye. Tergites and sternites not divided. Tergal chaetotaxy:  $\sigma$ , 2: 2-4: 4: 4: 4: 4: 4-6: 5-7: 6-7: 4-6: 6-7: 2;  $\varphi$ , 2: 2-4: 3-5: 4: 4: 4-5: 4-6: 4-6: 5-7: 6-7: 7-8: 2. Sternal chaetotaxy:  $\sigma$ , 6-7: (0)3-4 [1-6] (0): (0)4(0): 5-6: 4: 4: 4-5: 6: 6: 7-8: 2;  $\varphi$ , 5-9: (0)4(0): (0)4-5(0): 4-6: 4: 4-5: 4: 6: 6: 7: 2. Coxal chaetotaxy:  $\sigma$ , 4: 3-5: 5-6: 6-7;  $\varphi$ , 4-6: 4-8: 6-11: 9-13. Genital opercula (Figs 77, 78) not unusual. Male genitalia (Fig. 74) with lateral apodeme and lateral rod fused into broad plate with large central hole; dorsal apodeme posteriorly directed; posterior ventral diverticulum circular; median genital sac bilid. Female genitalia (Fig. 69) with small lateral cribriform plates and 2 median cribriform plates. Spiracles with stigmatic helix. Legs (Figs 75, 76): diplotarsate; basifemur and telofemur of legs I and II subequal; arolium longer than claws; claws simple; arolium undivided.

Dimensions (mm),  $\sigma$  ( $\varphi$ ): body length 1.27-1.54 (1.59-1.95); pedipalps: trochanter 0.21-0.245/0.115-0.13 (0.235-0.275/0.13-0.16), femur 0.33-0.375/0.13-0.14 (0.34-0.455/0.13-0.18), tibia 0.34-0.385/0.155-0.165 (0.345-0.455/0.16-0.20), chela (with pedicel) 0.62-0.68/0.205-0.23 (0.655-0.78/0.235-0.275), chela (without pedicel) 0.56-0.62 (0.60-0.72), moveable finger length 0.275-0.335 (0.28-0.34), hand length 0.285-0.315 (0.325-0.365); chelicera 0.145-0.17/0.095 (0.195-0.215/0.10-0.12), moveable finger length 0.12-0.13 (0.135-0.14); carapace 0.455-0.51/0.35-0.39 (0.445-0.565/0.375-0.50), anterior eye 0.06 (0.055-0.07), posterior eye 0.03-0.04 (0.035-0.045); leg I: trochanter 0.085-0.095/0.075-0.08 (0.095-0.11/0.085-0.095), basifemur 0.095-0.125/0.08-0.085 (0.135-0.175/0.09-0.10), telofemur 0.135-0.145/0.085 (0.145-0.175/0.09-0.105), tibia 0.155-0.165/0.06 (0.18-0.20/0.06-0.07), basitarsus 0.09-0.115/0.045-0.05 (0.085-0.095/0.045-0.05), telotarsus 0.08-0.09/0.035-0.04 (0.09-0.11/0.04-0.045); leg IV: trochanter 0.13-0.155/0.10-0.105 (0.16-0.19/0.105-0.14), basifemur 0.125-0.13/0.095-0.10 (0.13-0.165/0.10-0.12), telofemur 0.26-0.32/0.145-0.16 (0.34-0.395/0.16-0.19), tibia 0.25-0.26/0.075-0.085 (0.275-0.325/0.08-0.10), basitarsus 0.10-0.11/0.05-0.055 (0.11-0.135/0.055-0.065), telotarsus 0.12-0.13/0.045-0.05 (0.13-0.15/0.05-0.055).

Tritonymphs: colour paler than adults. Pedipalp: trochanter 1.73-1.80, femur 2.15-2.29, tibia 1.93-2.17, chela (with pedicel) 2.76-2.94, chela (without pedicel) 2.61-2.69, hand 1.32-1.45 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria (Fig. 71); *isb* and *sb* absent. Serrula exterior of chelicera with 16-17 lamellae; galea as in female. Carapace with 8-9 setae on medial section, with 2 setae on posterior margin; 0.94-1.41 times as long as broad. Tergal chaetotaxy: 2-3: 4: 4: 4: 4: 4: 4-5: 6: 6: 6: 2. Sternal chaetotaxy: 0: (0)4(0): (1)2(1): 6: 4: 4: 4-5: 4-6: 6: 5-7: 2. Coxal chaetotaxy: 4: 4: 3-4: 4-7. Diplotarsate.

Dimensions (mm): body length 1.45-1.84; pedipalps: trochanter 0.18-0.21/0.10-0.12, femur 0.26-0.32/0.115-0.14, tibia 0.27-0.315/0.14-0.16, chela (with pedicel) 0.525-0.61/0.18-0.21, chela (without pedicel) 0.48-0.565, moveable finger length 0.245-0.265, hand length 0.25-0.305; carapace 0.38-0.405/0.32-0.405.

Deutonymphs: colour paler than adults. Pedipalp: trochanter 1.56-1.72, femur 2.47-2.61, tibia 1.83-2.00, chela (with pedicel) 2.81-2.97, chela (without pedicel) 2.56-2.69, hand 1.31-1.38 times as long as broad. Fixed chelal finger with 6 trichobothria, moveable chelal finger with 2 trichobothria (Fig. 72); *esb*, *isb*, *sb* and *st* absent. Serrula exterior of chelicera with 14-15 lamellae; galea as in female. Carapace with 7-8 setae on medial section and 2 setae on posterior margin; 0.86-0.94 times as long as broad. Tergal chaetotaxy: 2: 2-3: 2: 4: 4: 4: 4: 4-5: 4-5: 4-5: 2. Sternal chaetotaxy: 0: (0)2(0): (1)2(1): 3-4: 2: 2: 2-3: 4-6: 6: 7: 2. Coxal chaetotaxy: 3: 2: 2: 2. Diplotarsate.

Dimensions (mm): body length 0.97-1.18; pedipalps: trochanter 0.14-0.155/0.085-0.09, femur 0.225-0.235/0.09-0.095, tibia 0.22-0.23/0.11-0.12, chela (with pedicel) 0.415-0.45/0.145-0.16, chela (without pedicel) 0.38-0.41, moveable finger length 0.185-0.22, hand length 0.20-0.21; carapace 0.28-0.32/0.305-0.37.

Protonymphs: colour paler than adults. Pedipalp: trochanter 1.79, femur 1.44, tibia 1.83, chela (with pedicel) 2.83, chela (without pedicel) 2.58, hand 1.29 times as long as broad. Fixed chelal finger with 3 trichobothria, moveable chelal finger with 1 trichobothrium (Fig. 73); *eb*, *et*, *ist* and *t* present. Serrula exterior of chelicera with 11 lamellae; galea as in female. Carapace with 4 setae on medial section and 2 setae on posterior margin; 1.00 times as long as broad. Tergal chaetotaxy: 2: 2: 2: 2: 2: 2: 2: 4: 4: 4: 2. Sternal chaetotaxy: 0: (0)2(0): (1)2-4(1): 2-4: 2: 2: 2: 2: 2: 4: 2. Coxal

chaetotaxy: 1: 1: 1: 1. Diplotarsate.

Dimensions (mm): body length 0.89–0.99; pedipalps: trochanter 0.125/0.07, femur 0.18/0.08, tibia 0.165/0.09, chela (with pedicel) 0.34/0.12, chela (without pedicel) 0.31, moveable finger length 0.155, hand length 0.155; carapace 0.28/0.28.

*Remarks.* Beier (1957) utilized the shape of the carapace and the number of carapacial setae to divide this species into four subspecies. I have examined much of his original material, including the primary types, as well as additional material from Krakatau and do not agree with his conclusions. The shape of the carapace is more variable than he stated, even within populations, and the number of carapacial setae varies. Indeed, even within the type series of *X. oceanicum reductum* there is considerable variation in the number of setae in the median area, including bilateral variation in individual specimens, as demonstrated for *Beierolpium benoiti* Mahnert by Mahnert (1978, fig. 1). Thus, all of the subspecies described by Beier (1957) are here synonymized with *B. oceanicum*.

Holotypes were not designated for *Garypinus oceanicus*, *Xenolpium oceanicum palauense* and *X. oceanicum reductum* by their authors, and lectotypes have been nominated herein accordingly. With (1907) stated that five males and six females were present in the type collection of *G. oceanicus*, but only two males and four females were present in the BMNH collections (Mr P. D. Hill-yard, pers. comm.).

This species is widely distributed in the Asian region from Samoa in the east to Krakatau in the west.

### Withiidae

#### Metawithius Chamberlin

#### *Metawithius yurii* (Redikorzev)

#### Figures 79–85

*Microwithius yurii* Redikorzev, 1938: 106–108, figs 35–38.—Beier, 1951: 104.

*Metawithius (Microwithius) yurii* (Redikorzev).—Beier, 1954: 45.

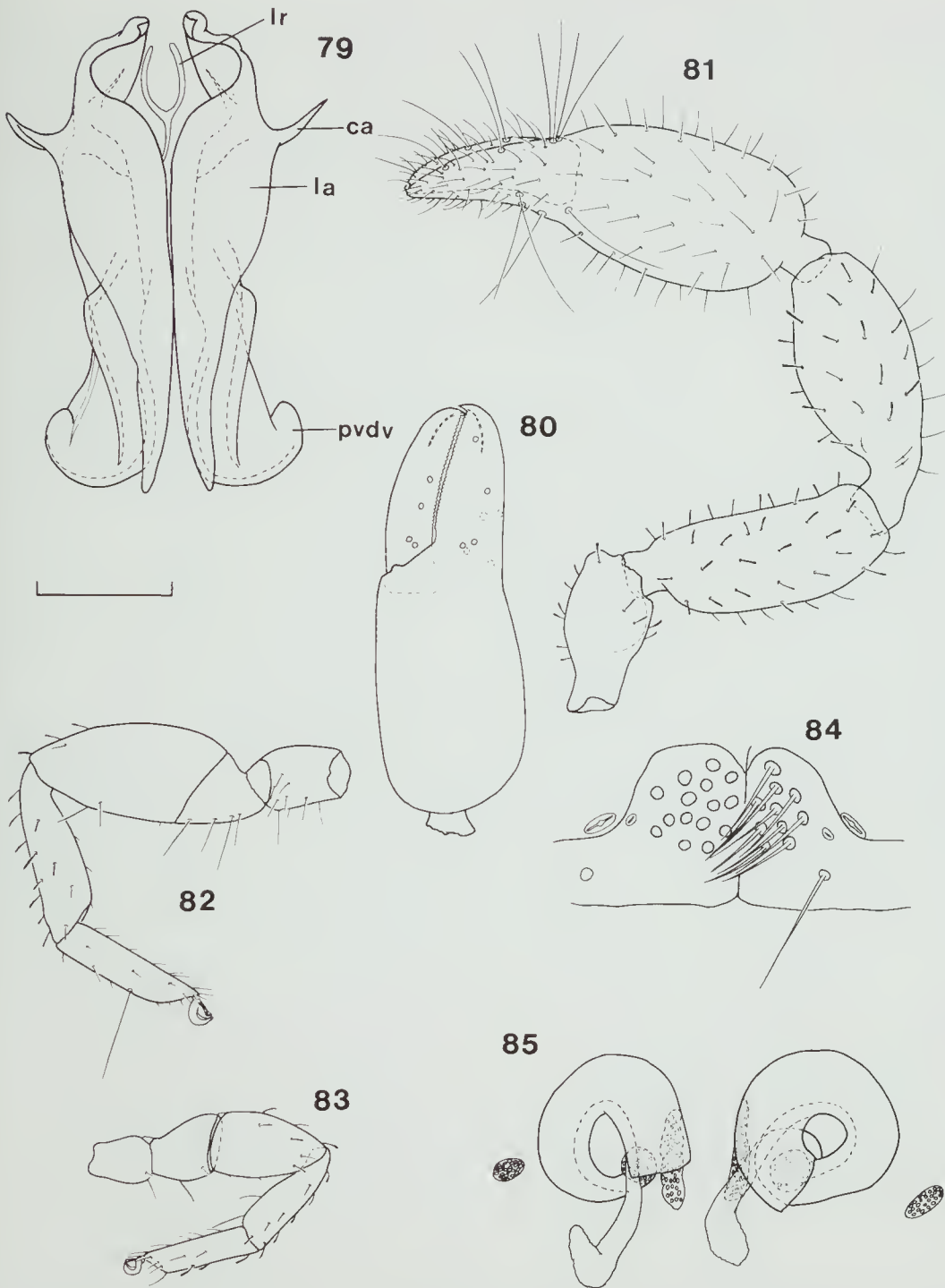
*Type material.* Syntypes: 1 ♂, Duong-Dong, Ile Phu-Quoc [Dao Phu Quoc], Kampuchea, Feb 1930, C. Dawydoff (MNHN); 1 ♂, same data except 25 Nov 1931 depository unknown, not examined; 2 ♂, archipel Pulo-Condore, Vietnam, 10 Apr 1931, C. Dawydoff (depository unknown, not examined).

*Other material examined.* Krakatau Islands. Rakata, south face, 6°10'S, 105°26'E, 20–50 m, beating, 25 Aug 1985, 1 ♂ (ANIC, 224-GM, MH841.01, SL). Sertung,

6°05'S, 105°23'E: under bark of dead *Ficus* sp. on beach, 11 Sep 1984, 1 ♂ (MZB, 151-R, MH853.01, SL); ridge, beating in rainforest, 11 Sep 1984, 1 ♂, 1 ♀ (MZB, 151-AD, MH852.01–02, SL); east ridge, beating in rainforest, 19 Aug 1985, 1 ♂ (NMV, 244-EJ, MH873.01, SL).

*Diagnosis.* Males of this species are very similar to three other species traditionally placed in the subgenus *Microwithius* Redikorzev based on the possession of setal patches on sternites VII–XI: *M. indicus* Murthy and Ananthakrishnan (India), *M. chamundiensis* Sivaraman (India) and *M. bulli* Sivaraman (India). Unfortunately, the genitalia of these species have yet to be described and thus comparisons with *M. yurii* cannot be made.

*Description.* Colour: pedipalps, carapace and tergites red-brown. Surfaces of carapace, tergites and trochanter, femur and tibia of pedipalps coarsely granulate; those of chela and sternites smooth. Pleural membrane longitudinally striate, wrinkled. Pedipalp (Fig. 81): trochanter 1.42–1.94 (♂), 1.79 (♀), femur 2.63–2.84 (♂), 2.78 (♀), tibia 2.34–2.66 (♂), 2.45 (♀), chela (with pedicel) 3.02–3.10 (♂), ? (♀), chela (without pedicel) 2.79–2.88 (♂), ? (♀), hand 1.63–1.73 (♂), ? (♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb*, *esb* adjacent, basal, *est* midway between *esb* and *et*, *ib*, *isb*, *ist* and *it* grouped together basally, *b* and *sb* adjacent, *st* slightly closer to *t* than to *sb* (Fig. 80). Venom apparatus present in both chelal fingers; nodus ramosus near *et* in fixed finger and between *t* and tip of finger in moveable finger. Fixed finger with 26–28 (♂), 28 (♀) marginal teeth, moveable finger with 28–30 (♂), 31 (♀) marginal teeth, accessory teeth absent. Chelicera with 5 setae on hand, *bs* and *sbs* denticulate, remainder acuminate; serrula exterior with 17–18 (♂), ? (♀) lamellae; flagellum of 4 blades, anterior blade with 4–5 spinules on anterior face, remainder smooth; galea long, with 6 distal to subdistal rami. Carapace with 6–8 (♂), 5 (♀) setae on posterior margin; 1.21–1.28 (♂), 1.26 (♀) times as long as broad, widest medially; 1 pair of eye spots present; median furrow present. Tergites 11–IX and sternites V–X divided. Tergal chaetotaxy: ♂, 8–9: 9: 9–10: 10–11: 10–12: 11–12: 10–12: 10–13: 10–11: 9–10: 7–8: 2; ♀, 9: 9: 9: 14: 12: 14: 11: 13: 10: 11: 8: 2. Sternal chaetotaxy: ♂, 4: (1)6–9(1): (2)9–10(2): 15–17: 14–15: 10–12[12–14/11–17]: 10–13[14–15/12–20]: 11[10–13/12–15]: 12–13: 9–11: 2; ♀, 0: 9: (1)8(1): (2)11(2): 16: 14: 14: 16: 17: 12: 12: 2. Sternites VII–IX of male with paired median sense patches (Fig. 84). Coxal chaetotaxy: ♂, 6–7: 7: 7–8: 11–12;



Figures 79–85. *Metawithius yurii* (Redikorzev). Figs 79–81, 84, male, MH853.01. Figs 82–83, 85, female, MH852.02. Fig. 79, genitalia, ventral. Fig. 80, left chela, lateral. Fig. 81, right pedipalp, dorsal. Fig. 82, left leg IV. Fig. 83, left leg I. Fig. 84, setal patches on sternite IX (setae on right half omitted), ventral. Fig. 85, spermathecae. Scale line = 0.14 mm (figs 79, 85), 0.25 mm (figs 81–83), 0.07 mm (fig. 84).

♀, 7: 7: 5: 13. Genital opercula not unusual. Male genitalia (Fig. 79): lateral rod Y-shaped; lateral apodeme elongate, with lateral chitinised arch; posterior diverticulum of dorsal diverticulum rounded. Female genitalia (Fig. 85) with coiled spermathecae; glandular strip adjacent to, and lying over, spermathecae; median cribriform plates long and elongate, lateral cribriform plates ovoid. Spiracles with stigmatic helix. Legs (Figs 82, 83): monotarsate; junction of basifemur and telofemur of leg I slightly oblique; tarsus IV with median tactile seta, TS = 0.54–0.60 (♂), 0.51 (♀); subterminal tarsal seta simple, curved; arolium slightly shorter than claws; claws simple.

Dimensions (mm), ♂ (♀): body length 1.70–2.08 (2.39); pedipalps: trochanter 0.27–0.32/0.155–0.19 (0.295/0.165), femur 0.505–0.57/0.18–0.215 (0.555/0.20), tibia 0.50–0.55/0.205–0.235 (0.54/0.22), chela (with pedicel) 0.79–0.86/0.255–0.28 (0.875/?), chela (without pedicel) 0.735–0.795 (0.81), moveable finger length 0.32–0.37 (0.35), hand length 0.44–0.48 (0.47); chelicera 0.165–0.21/0.105–0.11 (0.145/0.11), moveable finger length 0.14–0.16 (0.16); carapace 0.56–0.655/0.455–0.515 (0.66/0.525); leg I: trochanter 0.125–0.135/0.095–0.105 (0.13/0.095), basifemur 0.115–0.135/0.135–0.145 (0.135–0.135), telofemur 0.225–0.265/0.135–0.145 (0.255/0.135), tibia 0.22–0.255/0.085–0.09 (0.235/0.075), tarsus 0.195–0.225/0.055–0.065 (0.22/0.055); leg IV: trochanter 0.205–0.21/0.105–0.13 (0.225/0.115), basifemur 0.165–0.175/0.125–0.14 (0.19/0.13), telofemur 0.35–0.39/0.175–0.20 (0.385/0.195), tibia 0.33–0.36/0.095–0.105 (0.365/0.10), tarsus 0.27–0.28/0.065–0.07 (0.345/0.07), distance of tarsal tactile seta from proximal margin 0.145–0.165 (0.175).

*Remarks.* The coiled spermathecae of *M. yurii* are the first such spermathecae to be recorded in the Withiidae, but the genitalia of most withiid species have not been described.

I have examined the syntypes of *Metawithius murrayi* (Pocock), the type species of the genus, (one male and one female, BMNH, 1898.10.14.7-9), but the internal genitalia were not examined in detail. It is apparent that these specimens are not conspecific with the material recorded by With (1906) from the Nicobars.

### Atemnidae

#### Paratennus Beier

#### *Paratennus assimilis* Beier

Figures 86–95

*Chelifer burmanicus* Thorell: Tullgren, 1912: 267 (misidentification).

*Paratennus assimilis* Beier, 1932a: 569–570, fig 9. – Beier, 1932c: 40.

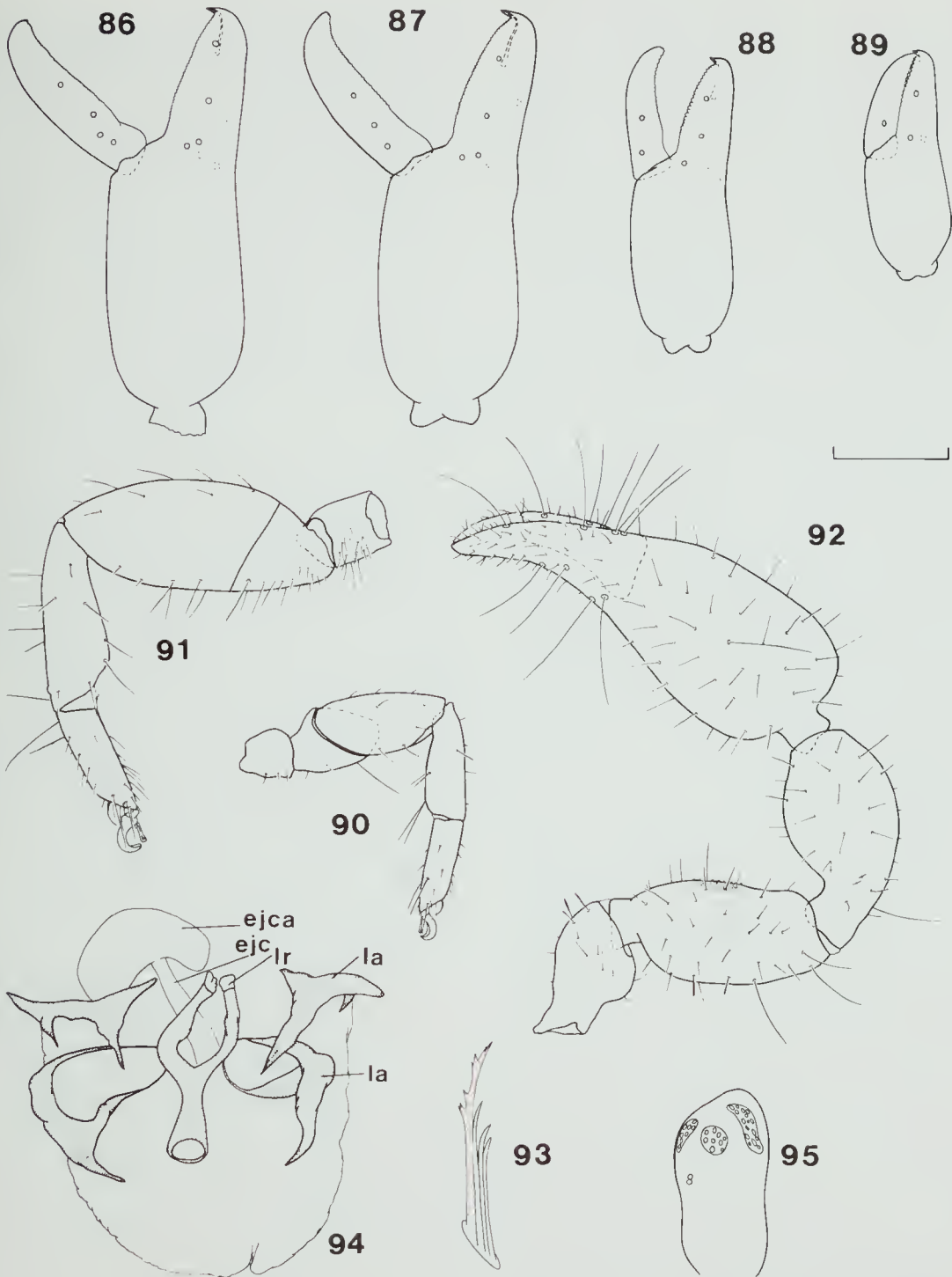
*Type material.* Lectotype ♂ (present designation), Kolambagan, North Mindanao, Philippines, 27 Jan 1915, Böttcher (ZMB, 28430, SP).

Paralectotypes: 3 ♀, same data as lectotype (ZMB, 28430, SP); 1 ♂, 1 ♀, Mommangan, North Mindanao, Philippines, 22 Feb 1915, Böttcher (ZMB, 28432, SP); 1 ♀, Insel Basilan, 11 Dec 1914, Böttcher (ZMB, 28431, SP).

*Other material examined.* Krakatau Islands, Rakata: Zwarte Hoek, 6°09'S, 105°25'E, in tent, 13 Sep 1984, 1 ♀ (MZB, 121-L, MH822.01, SL); south ridge, 6°10'S, 105°26'E, 100 m, beating, 4 Sep 1984, 1 ♀ (NMV, 178-A, MH838.01, SL); 850 ft (259 m), litter, 19 Sep 1984, 1 tritonymph, 2 protonymphs (MZB, 40-8, MH846.01-03, SL). "Krakatau", May 1908, 7 ♀, 4 tritonymphs, 1 deutonymph (RMNH, SP). Java, 2 km E of Carita, 6°16'S, 105°50'E, under bark of dead tree, rainforest, 26 Aug 1984, 3 ♂, 8 ♀, 3 tritonymphs, 1 deutonymph, 1 protonymph (1 ♂, 3 ♀, 2 tritonymphs, 1 protonymph in NMV, 2 ♀ in ANIC, remainder in MZB, 115-H, MH805.01-16, SL and SP).

*Diagnosis.* The only other described species of the genus *Paratennus* with minute denticles on the anterior margin of the pedipalpal femur, but with the other pedipalpal segments smooth or virtually so, is *P. ceylonicus* Beier, from which *P. assimilis* differs by the slightly thinner leg segments [e.g. tibia IV 2.95–2.98 (♂), 2.85–3.19 (♀) times as long as broad].

*Description.* Adults: pedipalps dark red-brown, carapace, legs and tergites lighter, carapace and tergites of similar colouration. Derm of pedipalps, carapace and tergites fairly smooth, except for anterior face of pedipalpal femur and, to a lesser extent, tibia which possess minute denticles. Pedipalp (Fig. 92): trochanter 1.70–1.76 (♂), 1.69–1.80 (♀), femur pedicellate 2.10–2.30 (♂), 2.22–2.38 (♀), tibia pedicellate 1.82–1.89 (♂), 1.86–2.00 (♀), chela (with pedicel) 2.66–2.70 (♂), 2.58–2.87 (♀), chela (without pedicel) 2.56–2.60 (♂), 2.45–2.70 (♀), hand 1.43–1.51 (♂), 1.40–1.61 (♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb* and *esb* adjacent, *est* slightly closer to *esb* than to *et*, *ib* and *isb* adjacent, *ist* and *it* adjacent, medial, *b* and *sb* adjacent, *st* closer to *sb* than to *t* (Fig. 86) (*ist* of 1 female on left chela near *isb* and *ib*). Venom apparatus present in fixed chelal finger terminating in nodus ramosus proximal to *et*. Fixed finger with 36 (♂), 34–38 (♀) marginal teeth, without accessory teeth; moveable finger with 46–47 (♂), 39–48 (♀) marginal teeth,



Figures 86-95. *Paratemnus assimilis* Beier. Figs 86, 92, female, MH805.09. Fig. 87, tritonymph, MH805.12. Fig. 88, deutonymph, MH805.15. Fig. 89, protonymph, MH805.16. Figs 90, 91, 93, 94, male, MH805.01. Fig. 95, female, MH822.01. Fig. 86, left chela, lateral. Fig. 87, left chela, lateral. Fig. 88, left chela, lateral. Fig. 89, left chela, lateral. Fig. 90, left leg I. Fig. 91, left leg IV. Fig. 92, right pedipalp, dorsal. Fig. 93, flagellum. Fig. 94, genitalia, ventral. Fig. 95 Spermatheca, ventral. Scale line = 0.35 mm (figs 86, 90-92), 0.25 mm (figs 87-89), 0.07 mm (figs 93-95).

without accessory teeth. Chelicera with 4 setae on hand, *sbs* absent, *bs* and *es* denticulate; serrula exterior of 21-22 ( $\sigma$ ), 20-23 ( $\varnothing$ ) lamellae; flagellum of 4 blades, anterior blade with several spinules on anterior face (Fig. 93); galea of male with 4 distal to subdistal rami, of female with 4 distal and 2 medial rami. Carapace with 6-7 ( $\sigma$ ), 6-9 ( $\varnothing$ ) setae on posterior margin, 1.09-1.18 ( $\sigma$ ), 0.98-1.26 ( $\varnothing$ ) times as long as broad; 2 eye spots present; without furrows. Tergites V-X and sternites V-X with very faint division. Tergal chaetotaxy:  $\sigma$ , 8: 7-8: 7-8: 10-11: 11-13: 11-13: 11-12: 11-14: 11-12: 12-13: 12: 2;  $\varnothing$ , 8-10: 7-10: 8-11: 9-11: 11-14: 10-15: 12-15: 10-15: 11-15: 13-16: 10-14: 2. Sternal chaetotaxy:  $\sigma$ , 16-18: (3)6-7[0](3): (1)7-8(1): 14-15: 13: 12-14: 13: 13-14: 14: 10: 2;  $\varnothing$ , 9-15: (2-3)6-8(2-3): (1)7-9(1-2): 12-16: 13-16: 13-16: 14-16: 14-16: 11-14: 2. Coxal chaetotaxy:  $\sigma$ , 10-11: 9: 6-9: 17-18;  $\varnothing$ , 8-12: 6-11: 6-11: 14-19. Genital opercula not unusual. Male genitalia (Fig. 94): lateral rod Y-shaped; ejaculatory atrium moderately large. Female spermathecae of 1 receptaculum, with several cribriform plates externally (Fig. 95). Legs (Figs 90, 91): monotarsate; femoral junction of legs I and II oblique; tibia IV 2.95-2.98 ( $\sigma$ ), 2.85-3.19 ( $\varnothing$ ) times as long as broad; subterminal tarsal seta simple, curved; leg IV with one tactile seta basally on tarsus; claws simple; arolium slightly shorter than claws.

Dimensions (mm),  $\sigma$  ( $\varnothing$ ): body length 2.81-3.67 (2.69-4.05); pedipalps: trochanter 0.45-0.475/0.255-0.275 (0.395-0.475/0.225-0.27), femur 0.715-0.805/0.33-0.35 (0.62-0.795/0.27-0.345), tibia 0.69-0.755/0.38-0.40 (0.59-0.745/0.31-0.38), chela (with pedicel) 1.30-1.405/0.485-0.52 (1.13-1.40/0.40-0.52), chela (without pedicel) 1.255-1.34 (1.075-1.335), moveable finger length 0.555-0.62 (0.47-0.625), hand length 0.73-0.765 (0.62-0.775); chelicera 0.345-0.36/0.17-0.195, (0.315-0.375/0.155-0.19), moveable finger length 0.265-0.29 (0.23-0.30); carapace 0.905-0.985/0.765-0.87 (0.81-0.92/0.685-0.94); leg I: trochanter 0.18/0.145 (0.16-0.18/0.135-0.16), basifemur 0.245-0.26/0.205-0.21 (0.23-0.27/0.185-0.215), telofemur 0.42-0.425/0.19-0.20 (0.365-0.43/0.165-0.205), tibia 0.39-0.40/0.13-0.135 (0.34-0.395/0.11-0.14), tarsus 0.32-0.325/0.095-0.10 (0.305-0.34/0.075-0.10); leg IV: trochanter 0.275-0.295/0.205-0.21 (0.285-0.315/0.185-0.215), basifemur 0.335-0.38/0.25-0.255 (0.305-0.36/0.22-0.26), telofemur 0.69-0.70/0.345-0.355 (0.58-0.715/0.28-0.35), tibia 0.59-0.605/0.20-0.205 (0.525-0.61/0.175-0.205), tarsus 0.415-0.42/

0.13-0.135 (0.365-0.43/0.10-0.13).

Tritonymphs; colour pale. Pedipalp: trochanter 1.66-1.70, femur 2.30-3.00, tibia 1.87-2.08, chela (with pedicel) 2.78-2.95, chela (without pedicel) 2.65-2.83, hand 1.55-1.65 times as long as broad; hand longer than fingers. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria; *ist* and *sb* absent (Fig. 87). Chelicera with 4 setae on hand; serrula exterior with 16-20 lamellae; moveable finger with 1 seta; galea long with 3-5 distal to subdistal rami. Carapace with 6-7 setae on posterior margin; 1.06-1.20 times as long as broad. Tergal chaetotaxy: 6-8: 6: 6-7: 7-8: 9-11: 6-10: 9-11: 8-11: 8-10: 10-14: 8-11: 2. Sternal chaetotaxy: 2-5: (2-3)5-6(2-3): (1)5-6(1): 10-12: 7-11: 9-10: 10-11: 9-11: 10-13: 8-11: 2. Coxal chaetotaxy: 6-8: 4-7: 4-6: 8-12. Monotarsate.

Dimensions (mm): body length 2.42-2.96; pedipalps: trochanter 0.315-0.34/0.19-0.20, femur 0.505-0.63/0.21-0.225, tibia 0.47-0.54/0.245-0.26, chela (with pedicel) 0.93-0.965/0.315-0.34, chela (without pedicel) 0.89-0.92, moveable finger length 0.375-0.445, hand length 0.505-0.55; carapace 0.66-0.75/0.55-0.66.

Deutonymph: colour pale. Pedipalps: trochanter 1.81, femur 2.23, tibia 1.88, chela (with pedicel) 2.83, chela (without pedicel) 2.76, hand 1.46 times as long as broad; hand longer than fingers. Fixed chelal finger with 6 trichobothria, moveable chelal finger with 2 trichobothria; *esb*, *ist*, *sb* and *st* absent (Fig. 88). Chelicera with 4 setae on hand; serrula exterior with 17 lamellae; moveable finger with 1 seta; galea long with 3 distal to subdistal rami. Carapace with 6 setae on posterior margin; 1.11 times as long as broad. Tergal chaetotaxy: 6: 6: 6: 6: 6: 7: 6: 6: 8: 8: 2. Sternal chaetotaxy: 1: (1)4(1): (1)4(1): 8: 7: 8: 7: 6: 8: 2. Coxal chaetotaxy: 4: 4: 3: 6. Monotarsate.

Dimensions (mm): body length 2.29; pedipalps: trochanter 0.235/0.13, femur 0.335/0.15, tibia 0.32/0.17, chela (with pedicel) 0.65/0.23, chela (without pedicel) 0.635, moveable finger length 0.315, hand length 0.335; carapace 0.63/0.57.

Protonymphs: colour very pale. Pedipalps: trochanter 1.58-1.70, femur 1.91-2.33, tibia 1.68-1.93, chela (with pedicel) 2.83-3.00, chela (without pedicel) 2.69-2.83, hand 1.47-1.64 times as long as broad; hand longer than finger. Fixed chelal finger with 3 trichobothria, moveable chelal finger with 1 trichobothrium; *eb*, *et*, *ib* and *t* present (Fig. 89). Chelicera with 4 setae on hand; serrula exterior with 14-15 lamellae; moveable finger without seta; galea long with 3 distal rami. Carapace with 4-5 setae on posterior margin; 0.79-1.01 times as long as broad. Tergal



chaetotaxy: 4: 4: 4: 4: 4-5: 4-5: 4-5: 4: 4: 4: 4: 2.  
Sternal chaetotaxy: 0: (0)2(0): (1)2(1): 4: 4: 4: 4:  
4: 4: 2. Coxal chaetotaxy: 2: 2: 2: 2. Monotarsate.

Dimensions (mm): body length 1.41-1.55; pedipalps: trochanter 0.18-0.195/0.115-0.12, femur 0.23-0.28/0.12, tibia 0.235-0.27/0.135-0.145, chela (with pedicel) 0.51-0.54/0.18, chela (without pedicel) 0.485-0.51, moveable finger length 0.225-0.26, hand length 0.265-0.295; carapace 0.435-0.465/0.43-0.55.

*Remarks.* Beier (1932a) did not designate a holotype in the original description of *Paratemnus assimilis*, and thus a lectotype has been selected and labelled accordingly. Three syntypes from Momongan were not present in ZMB and could not be located for study.

Even though there is a moderate amount of variation in the size of this species, all of the specimens examined possess finely granulate anterior margins of the palpal femur and relatively slender fourth tibiae, and are thus considered conspecific. The south-east Asian species of the genus are badly in need of revision, and the key presented for the genus by Beier (1932a, 1932c) often relies on small differences in the size or thickness of the palpal segments and legs. Even though I have not been able to make comparisons with other species of the genus, the form of the male genitalia may provide very useful characters with which to reanalyse the specific status of the species within this complex genus. The form of the male genitalia of *P. assimilis* appears to be more similar to the atemnine genus *Oratemnus* and the Miratemninae than to the atemnines *Atemnus* and *Titanatemnus* (Chamberlin 1933, 1939, Vachon 1938). The orientation of the lateral rod in *Paratemnus*, *Oratemnus* and the three miratemnine genera is probably plesiomorphic, while the form recorded for *Atemnus* and *Titanatemnus*, with its reversed lateral rod (Vachon 1938) appears to be apomorphic. The male genitalia of the other atemnine genera have yet to be described.

Tullgren (1912) recorded this species as *Chelififer birmanicus* Thorell from Krakatau based on material collected by E. Jacobson in 1908. I have examined Jacobson's material and it is clearly not conspecific with *C. birmanicus*, now placed in the genus *Catatemnus* (Beier, 1932a, 1932c). Tullgren (1912) erroneously claimed that only nymphs were present in the Krakatau collection.

### Chernetidae

#### Haplochernes Beier

#### *Haplochernes warburgi* (Tullgren)

#### Figures 96-104

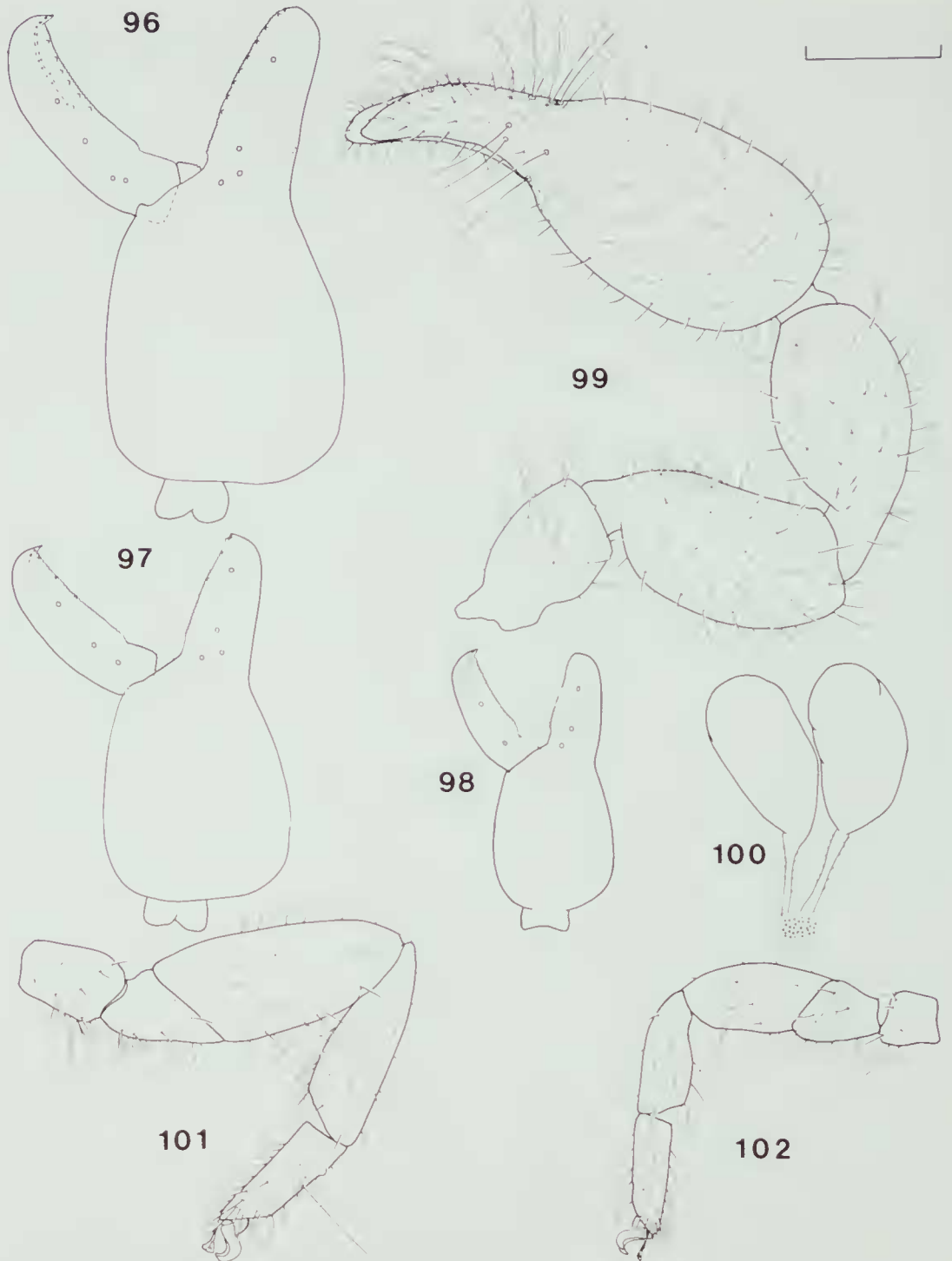
*Chelififer warburgi* Tullgren, 1905: 42-43, figs 3a-b.  
*Haplochernes warburgi*.—Beier, 1932c: 112, fig. 129.—Weidner, 1959: 114.—Beier, 1965: 774-775.—Beier, 1973: 50.

*Type material.* Holotype ♀, Java, Nov 1890 (ZMH, SP).

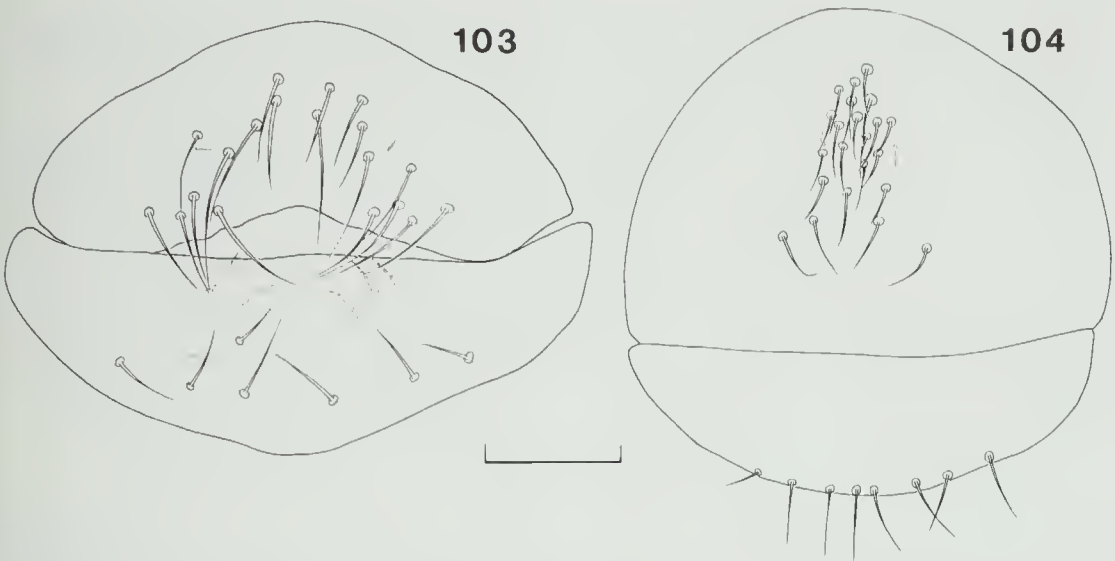
*Other material examined.* Krakatau Islands. Rakata, Zwarte Hoek, 6°09'S, 105°25'E: 31 Aug 1984, 3 ♂, 1 ♀ (MZB, 104-8B, MH823.02-05, SP); 22 Sep 1984, 1 ♀ (MZB, 122-BB, MH830.01, SL); beating, 12 Sep 1984, 1 ♂, 1 deutonymph (NMV, 121-AC, MH831.01-02, SL); in tent, 16 Sep 1984, 1 ♂ (ANIC, 121-AZ, MH832.01, SL); 21 Sep 1984, 1 ♀ (ANIC, 136-1A, MH833.01, SL); on table, 12 Sep 1984, 1 ♀ (with brood-sac) (NMV, 121-V, MH835.01, SL); on jerrycans, 3 Sep 1984, 1 tritonymph (NMV, 172-AA, MH834.01, SL). Rakata: Owl Bay, 6°09'S, 105°28'E, 22 Sep 1984, 1 ♀ (with brood-sac) (MZB, 100-7B, MH836.01, SL); south ridge, 6°10'S, 105°26'E, 20-50 m, beating, 25 Aug 1985, 1 ♂ (MZB, 224-GM, MH841.02, SP); 100 m, 4 Sep 1984, 1 ♀, 1 tritonymph (MZB, 178-A, MH838.02-03, SL); 850 feet (259 m), beating, 19 Sep 1984, 1 ♀ (NMV, 107-10, MH845.01, SP); west ridge, 6°09'S, 105°25'-26'E, 250 m, on human, 1 Sep 1984, 1 ♂ (MZB, 177-N, MH847.01, SP); beating, 1 deutonymph (MZB, 177-M, MH848.01, SL); 850 feet (259 m), beating, 16 Sep 1984, 2 tritonymphs (MZB, 166-1A, MH849.01-02, SL); 850-1100 feet (259-335 m), beating, 19 Sep 1984, 1 deutonymph (NMV, 107-3A, MH850.01, SL). Sertung, 6°05'S, 105°23'E: 100 feet (30 m), beating, rainforest, 11 Sep 1984, 3 ♂ (NMV, 175-B, MH854.01-03, SP); 250 feet (76 m), beating, 11 Sep 1984, 1 ♂, 1 ♀ (ANIC, 175-A, MH855.01-02, SP); rainforest, sweeping, 19 Aug 1985, 1 ♂ (MZB, 245-HC, MH856.01, SP); rainforest, sweeping, 19 Aug 1985, 1 ♂ (MZB, 245-LZD, MH857.01, SP). Sertung, spit, 6°04'S, 105°24'-25'E, beating, *Casuarina equisetifolia*, 18 Aug 1985, 2 ♂, 1 ♀, 1 deutonymph (MZB, 244-AO, MH858.01-04, SP). Panjang, 6°05'S, 105°28'E: beating, 19 Sep 1984, 1 ♂ (MZB, 176-AA, MH860.01, SL); 16 Aug 1985, 1 ♂, 1 ♀ (NMV, 234-DR, MH867.01-02, SL); sweeping, 16 Aug 1985, 1 deutonymph (MZB, 235-CV, MH881.01, SP); 100 feet (30 m), beating, 15 Sep 1984, 3 ♂ (MZB, 176-A, MH865.01-03, SP); 14 Sep 1984, 1 ♂, 1 tritonymph (NMV, 176-AB, MH864.01-02, SP). Panjang, north, 6°05'S, 105°28'E, beating, 20 Sep 1984, 1 ♂ (MZB, 138-4D, MH859.01, SP). Java. Ujung Kulon: Cidaon, 6°46'S, 105°15'E, on branch, 22 Sep 1984, 1 ♂ (MZB, 14-B, MH818.01, SL); Gunung Payung, summit (480 m), 6°49'S, 105°16'E, beating, 12 Sep 1984, 1 deutonymph (MZB, 64-3C, MH819.01, SL).

*Diagnosis.* With its very deep chela, smooth pedipalpal tibia, yet denticulate anterior margins of femur and chela, this species most closely resembles *H. boninensis* Beier which is only slightly smaller in size.

*Description.* Adults: pedipalps and carapace dark brown, legs and tergites lighter. Derm of pedipalps



Figures 96-102. *Haplochernes warburgi* (Tullgren). Figs 96, 99, 100, female, MH833.01. Fig. 97, tritonymph, MH834.01. Fig. 98, deutonymph, MH848.01. Figs 101, 102, 104, female, MH836.01. Fig. 103, male, MH818.01. Fig. 96, left chela, lateral. Fig. 97, left chela, lateral. Fig. 98, left chela, lateral. Fig. 99, right pedipalp, dorsal. Fig. 100 Spermathecae, ventral. Fig. 101, left leg IV. Fig. 102, left leg I. Scale line = 0.25 mm (figs 96-99, 101-102), 0.10 mm (fig. 100).



Figures 103, 104. *Haplochneres warburgi* (Tullgren) cont. Fig. 103, genital opercula, ventral. Fig. 104, genital opercula, ventral. Scale line = 0.07 mm.

smooth, except for anterior margin of femur and internal margin of chelal hand near base of fingers which are finely denticulate; carapace and tergites slightly rugose. Pedipalp (Fig. 99) very stout: trochanter 1.71–1.86 ( $\sigma$ ), 1.66–1.79 ( $\varnothing$ ), femur abruptly pedicellate 2.19–2.35 ( $\sigma$ ), 2.06–2.32 ( $\varnothing$ ), tibia 1.83–2.19 ( $\sigma$ ), 1.83–2.13 ( $\varnothing$ ), chela (with pedicel) 2.27–2.54 ( $\sigma$ ), 2.41–2.76 ( $\varnothing$ ), chela (without pedicel) 2.14–2.40 ( $\sigma$ ), 2.27–2.61 ( $\varnothing$ ), hand 1.24–1.50 ( $\sigma$ ), 1.41–1.48 ( $\varnothing$ ) times as long as broad, chelal hand very deep. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria (Fig. 96); *eb* and *esb* adjacent, *est* much closer to *esb* than to *et*, internal series basal, *b* and *sb* adjacent, *st* slightly closer to *sb* than to *t* (one male is lacking *sb* and *st* from one finger). Venom apparatus present in moveable chelal finger terminating in nodus ramosus proximal to *t*. Fixed finger with 38–41 ( $\sigma$ ), 37–44 ( $\varnothing$ ) marginal teeth, plus 5–7 ( $\sigma$ ), 7–8 ( $\varnothing$ ) external accessory teeth; moveable finger with 43–45 ( $\sigma$ ), 46–53 ( $\varnothing$ ) marginal teeth, plus 5–8 ( $\sigma$ ), 6–9 ( $\varnothing$ ) external accessory teeth. Chelicera with 5 setae on hand, *sbs*, *bs* and *es* finely denticulate; serrula exterior of 20–21 ( $\sigma$ ), 20–22 ( $\varnothing$ ) lamellae; flagellum of 3 blades, anterior blade with spinules on anterior margin, central blade occasionally with 1 distal spinule; galea with 6–8 rami, distributed along length of galea, basal rami often longest, not sexually dimorphic. Carapace with 6 ( $\sigma$ ), 6–8 ( $\varnothing$ ) setae on posterior margin, 1.25–1.29 ( $\sigma$ ), 1.12–1.32 ( $\varnothing$ ) times as long as broad; 2 eye spots present; 2 fur-

rows present, anterior furrow moderately deep, posterior furrow shallow, closer to posterior edge of carapace than to anterior furrow. Tergites V–X and sternites V–X medially divided, often slightly. Tergal chaetotaxy:  $\sigma$ , 6–7: 6: 6: 6–9: 9: 9–10: 10–12: 10–13: 12–15: 14–15: 12: 2;  $\varnothing$ , 7–9: 6–8: 7–8: 8–9: 9–10: 11–12: 12–13: 13–14: 13–15: 16–17: 13–14: 2. Sternal chaetotaxy:  $\sigma$ , 19–23: (2–3)8–10[5–7](2–3): (1)4–5(1): 11–14: 12–14: 11–13: 13–17: 13–16: 14–18: 10–12: 2;  $\varnothing$ , 22–23: (3)8–10(3): (1)3–4(1): 12–16: 14–16: 13–14: 16–18: 16–17: 17–19: 13–14: 2. Coxal chaetotaxy:  $\sigma$ , 9–11: 8–12: 8–11: 13–18;  $\varnothing$ , 10: 9–12: 10–11: 38–41 (the latter includes several setae on dorsal edge above pedal foramen). Male genital opercula as in Fig. 103. Female genital opercula (Fig. 104): anterior operculum with tight, longitudinal cluster of setae. Male genitalia not unusual for family. Female spermathecae of 2 tubules ending in large inflated sacs (Fig. 100). Legs (Figs 101, 102): monotarsate; femoral junction of legs I and II oblique; subterminal tarsal seta simple, curved; leg IV with 1 tactile seta medially on tarsus, TS = 0.38–0.43 ( $\sigma$ ), 0.41–0.45 ( $\varnothing$ ); all tarsi with proximal elevated slit sensillum; claws simple; arolium as long as claws.

Dimensions (mm),  $\sigma$  ( $\varnothing$ ): body length 2.45–3.07 (2.27–3.59); pedipalps: trochanter 0.325–0.36/0.18–0.205 (0.34–0.375/0.20–0.21), femur 0.54–0.64/0.23–0.275 (0.535–0.595/0.25–0.26), tibia 0.515–0.605/0.235–0.315 (0.525–0.565/0.265–0.30), chela (with pedicel) 0.865–0.935/0.34–0.405 (0.94–1.005/0.355–0.40), chela (without

pedicel) 0.815–0.875 (0.885–0.93), moveable finger length 0.36–0.41 (0.395–0.46), hand length 0.42–0.575 (0.505–0.56); chelicera 0.245–0.28/0.13–0.14 (0.27–0.28/0.14–0.155), moveable finger length 0.20–0.215 (0.21–0.22); carapace 0.655–0.70/0.51–0.555 (0.635–0.765/0.54–0.60); leg I: trochanter 0.115–0.13/0.095–0.105 (0.115–0.13/0.11), basifemur 0.155–0.185/0.11–0.13 (0.175–0.18/0.12–0.13), telofemur 0.28–0.335/0.135–0.16 (0.30–0.335/0.145–0.155), tibia 0.24–0.285/0.095–0.11 (0.255–0.28/0.105–0.11), tarsus 0.23–0.26/0.07–0.075 (0.245–0.255/0.07–0.075); leg IV: trochanter 0.20–0.235/0.13–0.145 (0.20–0.235/0.14–0.145), basifemur 0.21–0.235/0.14–0.185 (0.245–0.25/0.165–0.185), telofemur 0.44–0.50/0.20–0.23 (0.475–0.505/0.21–0.225), tibia 0.385–0.44/0.12–0.135 (0.41–0.425/0.13–0.14), tarsus 0.275–0.315/0.085–0.095 (0.285–0.30/0.095–0.10), distance of tarsal tactile seta from proximal margin 0.115–0.135 (0.12–0.13).

Tritonymphs: colour paler than adults. Pedipalp: trochanter 1.59–1.68, femur 2.24–2.29, tibia 1.80–1.98, chela (with pedicel) 2.44–2.65, chela (without pedicel) 2.23–2.48, hand 1.30–1.37 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria (Fig. 97); *ist* and *sb* absent. Serrula exterior of chelicera with 16–18 lamellae; galea with 2–3 medial to subdistal and 2 distal rami. Carapace with 6–7 setae on posterior margin; 1.14–1.27 times as long as broad. Tergal chaetotaxy: 6–7: 5–6: 6–7: 6–8: 7–9: 8–9: 10: 10–12: 12: 13–15: 10–12: 2. Sternal chaetotaxy: 4–7: (2)5–6(2): (1)4–5(1): 8–12: 11–14: 12–14: 12: 12–15: 12–14: 10–11: 2. Coxal chaetotaxy: 6–8: 6–8: 6–9: 9–14. Monotarsate.

Dimensions (mm): body length 2.24–2.74; pedipalps: trochanter 0.255–0.28/0.155–0.175, femur 0.435–0.47/0.19–0.21, tibia 0.37–0.455/0.205–0.23, chela (with pedicel) 0.715–0.78/0.27–0.32, chela (without pedicel) 0.67–0.715, moveable finger length 0.325–0.335, hand length 0.37–0.415; carapace 0.57–0.615/0.485–0.50.

Deutonymphs: colour very pale. Pedipalp: trochanter 1.57–1.67, femur 2.00–2.13, tibia 1.57–1.69, chela (with pedicel) 2.64–2.80, chela (without pedicel) 2.47–2.58, hand 1.33–1.38 times as long as broad. Fixed chelal finger with 6 trichobothria, moveable chelal finger with 1 trichobothrium (Fig. 98); *esb*, *ist*, *sb* and *st* absent. Serrula exterior of chelicera with 15–17 lamellae; galea with 2 medial and 2 distal rami. Carapace with 6 setae on posterior margin; 1.18–1.21 times as long as broad. Tergal chaetotaxy: 5–6: 5–7: 5–6:

6: 5–6: 6–7: 6–7: 8: 8–10: 10: 8: 2. Sternal chaetotaxy: 0: (1)4(1): (1)4(1): 6–10: 8–10: 8–10: 8–10: 10: 9–10: 8–10: 2. Coxal chaetotaxy: 4: 4–5: 4–5: 5. Monotarsate.

Dimensions (mm): body length 1.97–2.13; pedipalps: trochanter 0.18–0.22/0.115–0.135, femur 0.27–0.33/0.13–0.155, tibia 0.245–0.275/0.145–0.175, chela (with pedicel) 0.495–0.595/0.18–0.225, chela (without pedicel) 0.46–0.555, moveable finger length 0.24–0.27, hand length 0.24–0.30; carapace 0.44–0.51/0.365–0.43.

*Remarks.* This species has also been reported from Sulawesi, Papua New Guinea and Sri Lanka.

### *Haplocheres kraepelini* (Tullgren)

Figures 105–112

*Chelifer kraepelini* Tullgren, 1905: 40–42, figs 2a–d. — Ellingsen, 1910: 367.

*Haplocheres kraepelini*. — Beier, 1932c: 113, fig. 130. — Beier, 1957: 33, figs 18a–b. — Weidner, 1959: 114.

*Type material.* Lectotype ♀ (present designation), Buitenzorg [now Bogor], Java, 8 Mar 1904 (ZMH, SP).

Paralectotypes: 4 ♀ (2 with brood-sacs), 3 ♂, 4 tritonymphs, same data as lectotype (ZMH, SP); 2 ♀ (with brood-sacs), 2 ♂, same data as lectotype except Mar 1904 (ZMH, SP). Also included in the syntype series is a male of *Oratemnus proximus* Beier (Atemnidae) (see below).

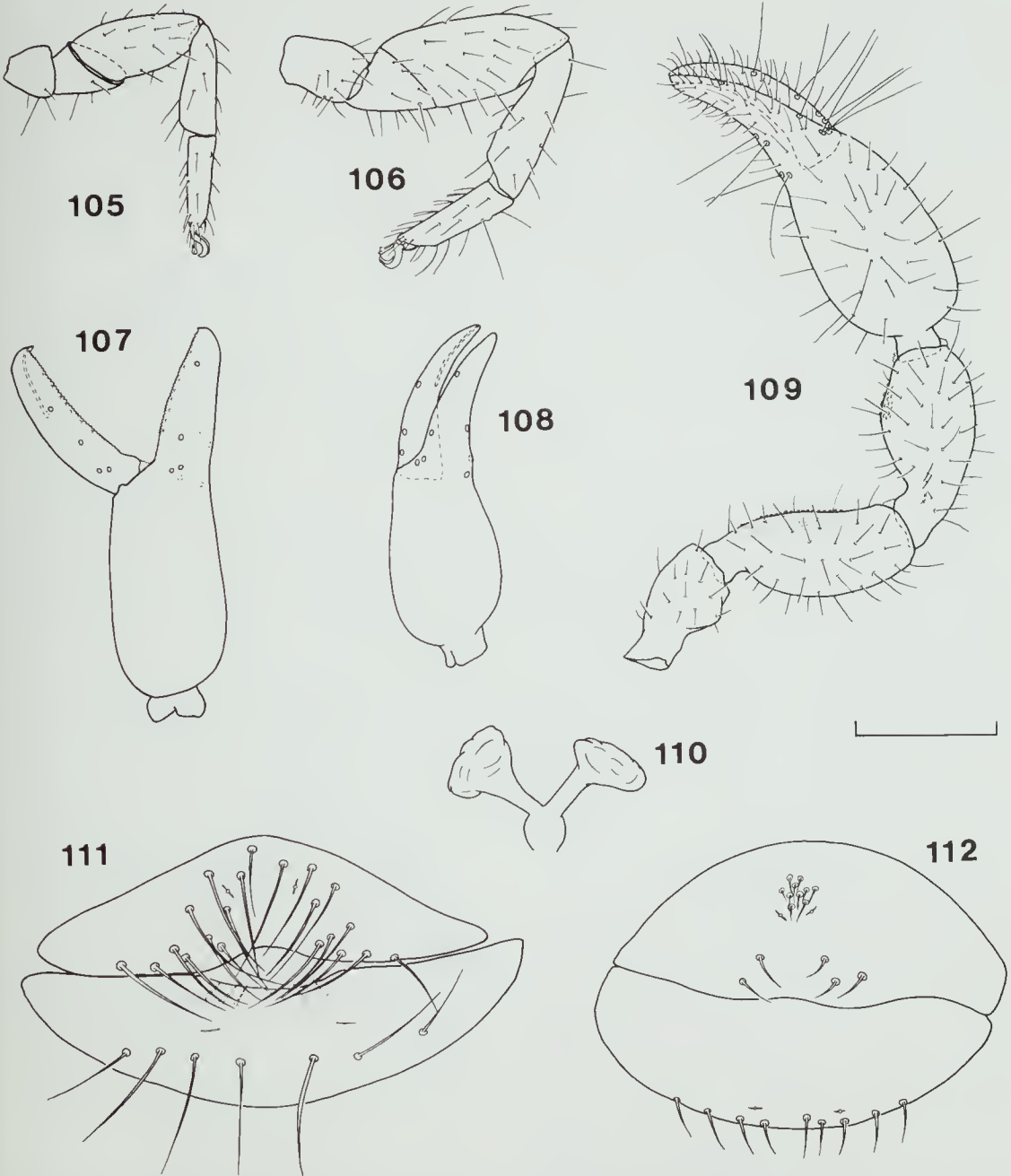
*Other material examined.* Krakatau Islands. Rakata, south ridge, 6°10'S, 105°26'E: 50–100 m, beating, 26 Aug 1985, 1 ♀ (MZB, 224-IU, MH839.01, SL); 400 m, beating, 24 Aug 1985, 1 ♂ (MZB, 224-DI, MH840.01, SL). Java. 1 km E of Carita, 6°16'S, 105°50'E, under bark of tree, rainforest, Aug 1984, 1 ♂, 5 ♀, 1 tritonymph (1 ♂, 2 ♀ in NMV, 1 ♀ in ANIC, remainder in MZB, 115-A, MH806.01–07, SL).

*Diagnosis.* This species shares with *H. hebridicus* Beier a granulate anterior face of the pedipalpal femur and tibia, and a smooth and virtually cylindrical chela. However, *H. hebridicus* has a more slender chelal hand (1.82 times as long as broad) compared with *H. kraepelini* (1.53–1.63 times as long as broad).

*Description.* Adults: pedipalps and carapace dark red-brown, legs and tergites lighter. Derm fairly smooth, except for pedipalpal trochanter, anterior face of pedipalpal femur and tibia, and anterior portion of carapace, which are granulate. Pedipalp (Fig. 109): trochanter 1.52–1.78 (♂), 1.60–1.84 (♀), femur pedicellate 2.46–2.59 (♂), 2.32–2.63 (♀), tibia 2.07–2.16 (♂), 2.03–2.19 (♀), chelal hand not particularly deep, 1.59–1.63 (♂), 1.53–1.57 (♀), chela (with pedicel) 2.92–3.15 (♂), 2.85–3.01 (♀), chela (without pedicel) 2.74–2.96 (♂), 2.69–2.85 (♀), hand 1.59–1.63 (♂), 1.53–1.57

(♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb* and *esb* adjacent, *est* much closer

to *esb* than to *et*, *it* and *ist* adjacent and close to *ib* and *isb*, *b* and *sb* adjacent, *st* closer to *sb* than to *t* (Fig. 107). Venom apparatus present in move-



Figures 105–112. *Haplochernes kraepelini* (Tullgren). Figs 105–107, 109, 110, 112, female, MH806.02. Fig. 108 tritonymph, MH806.07. Fig. 111, male, MH806.01. Fig. 105, left leg I. Fig. 106, left leg IV. Fig. 107, left chela, lateral. Fig. 108, left chela, dorsal. Fig. 109, right pedipalp, dorsal. Fig. 110 Spermathecae, ventral. Fig. 111, genital opercula, ventral. Fig. 112, genital opercula, ventral. Scale line = 0.35 mm (fig. 105–106), 0.40 mm (figs 107, 109), 0.49 mm (fig. 108), 0.07 mm (fig. 110), 0.10 mm (figs 111–112).

able chelal finger terminating in nodus ramosus near *t*. Fixed finger with 52-57 ( $\sigma$ ), 60 ( $\varnothing$ ) marginal teeth, plus 8-9 ( $\sigma$ ,  $\varnothing$ ) external accessory teeth; moveable finger with 51-63 ( $\sigma$ ), 58-67 ( $\varnothing$ ) marginal teeth, plus 4-9 ( $\sigma$ ), 6-8 ( $\varnothing$ ) external accessory teeth. Chelicera with 5 setae on hand, *bs*, *sbs* and *es* denticulate, *ls* and *is* longest; serrula exterior of 17-20 ( $\sigma$ ), 16-20 ( $\varnothing$ ) lamellae; flagellum of 3 blades, anterior blade with several spinules on anterior face; galea of male and female similar, with 5-6 distal to subdistal rami. Carapace with 6-9 ( $\sigma$ ), 6-11 ( $\varnothing$ ) setae on posterior margin, 1.11-1.25 ( $\sigma$ ), 1.02-1.27 ( $\varnothing$ ) times as long as broad; 2 eye spots present; with median furrow. Tergites III-X and sternites V-X divided. Tergal chaetotaxy:  $\sigma$ , 8-10: 10-13: 10-13: 12-15: 14-18: 16-18: 16-19: 16-19: 16-19: 15-20: 11-14: 2;  $\varnothing$ , 10-12: 10-12: 11-13: 11-15: 16-18: 16-19: 17-18: 16-20: 16-20: 17-20: 10-14: 2. Sternal chaetotaxy:  $\sigma$ , 20-22: (3)6-11[4-6] (3): (1)5-8(1): 13-19: 16-20: 16-21: 16-20: 15-19: 16-20: 10-14: 2;  $\varnothing$ , 13-19: (3)8-10(3): (1)6-9(1): 17-22: 17-21: 17-21: 18-21: 18-20: 16-20: 10-12: 2. Coxal chaetotaxy:  $\sigma$ , 12-16: 9-17: 11-16: 14-19;  $\varnothing$ , 10-14: 8-12: 9-13: 28-43. Male genital opercula as in Fig. 111. Female genital opercula as in Fig. 112. Male genitalia not unusual for family. Female spermathecae (Fig. 110) with 2 tubules terminating in large, inflated bulbs. Legs (Figs 105, 106): monotarsate; femoral junction of legs I and II oblique; leg IV with tactile seta on tarsus, TS = 0.29-0.32 ( $\sigma$ ), 0.29-0.31 ( $\varnothing$ ); subterminal tarsal seta simple, curved; all tarsi with proximal elevated slit sensillum; claws simple; arolium shorter than claws.

Dimensions (mm),  $\sigma$  ( $\varnothing$ ): body length 2.21-2.85 (2.47-3.56); pedipalps: trochanter 0.435-0.50/0.255-0.33 (0.375-0.465/0.22-0.265), femur 0.68-0.81/0.265-0.325 (0.62-0.73/0.245-0.305), tibia 0.62-0.745/0.30-0.345 (0.59-0.70/0.27-0.34), chela (with pedicel) 1.175-1.32/0.38-0.445 (1.10-1.315/0.365-0.44), chela (without pedicel) 1.07-1.24 (1.02-1.245), moveable finger length 0.495-0.57 (0.435-0.59), hand length 0.605-0.62 (0.58-0.64); chelicera 0.255-0.275/0.115-0.15 (0.25-0.28/0.115-0.17), moveable finger length 0.20-0.225 (0.195-0.225); carapace 0.73-0.84/0.635-0.73 (0.67-0.845/0.635-0.745); leg I: trochanter 0.145-0.165/0.135-0.15 (0.145-0.165/0.13-0.155), basifemur 0.21-0.205/0.14-0.15 (0.19-0.22/0.14-0.165), telofemur 0.36-0.37/0.15-0.165 (0.35-0.445/0.165-0.18), tibia 0.30-0.325/0.10 (0.30-0.35/0.095-0.12), tarsus 0.255-0.29/0.07-0.075 (0.265-0.30/0.065-0.075); leg IV: trochanter 0.25-0.26/0.145-0.175 (0.245-0.27/0.16-0.195), basifemur

0.265-0.29/0.18-0.205 (0.245-0.29/0.18-0.21), telofemur 0.51-0.60/0.235-0.27 (0.495-0.565/0.225-0.27), tibia 0.47-0.55/0.135-0.15 (0.495-0.54/0.13-0.165), tarsus 0.32-0.355/0.09-0.095 (0.305-0.35/0.085-0.10), distance of tarsal tactile seta from proximal margin 0.095-0.115 (0.095-0.10).

Tritonymphs: colour paler than adults. Pedipalp: trochanter 1.67-1.71, femur 2.07-2.43, tibia 1.93-2.08, chela (with pedicel) 2.84-3.00, chela (without pedicel) 2.67-2.84, hand 1.73 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria (Fig. 108); *ist* and *sb* absent. Serrula exterior of chelicera with 18 lamellae; galea medially bifurcate, each bifurcation with 2 distal rami. Carapace with 4 setae on posterior margin; 1.15-1.42 times as long as broad. Tergal chaetotaxy: 8-10: 6-8: 7-8: 10: 14-15: 14-16: 14-17: 14-16: 16-17: 16: 12: 2. Sternal chaetotaxy: 3: (2)6(2): (1)6(1): 14: 14: 13: 15: 17: 14: 12: 2. Coxal chaetotaxy: 5: 7: 6: 9. Monotarsate.

Dimensions (mm): body length 2.09-2.56; pedipalps: trochanter 0.275-0.30/0.165-0.175, femur 0.425-0.455/0.175-0.205, tibia 0.405-0.425/0.195-0.22, chela (with pedicel) 0.765-0.81/0.255-0.285, chela (without pedicel) 0.725-0.76, moveable finger length 0.385-0.39, hand length 0.44-0.45; carapace 0.575-0.61/0.405-0.53.

*Remarks.* Due to the presence of two species in the syntype series, a lectotype has been designated. The second species, *Oratemnus proximus* (Atemnidae), has hitherto only been reported from Sumatra (Beier, 1932a, 1933) and Sri Lanka (Beier, 1973), and this is the first record of this species from Java. As the only measurements of this species that have been presented in the literature are of the male holotype (Beier, 1932a, 1933), some measurements of the male from Bogor are given (the ratios are in parentheses): body length 3.13, pedipalps: femur 0.685/0.26 (2.63), tibia 0.635/0.30 (2.12), chela (with pedicel) 1.035/0.355 (2.92), chela (without pedicel) 1.015 (2.86), moveable finger length 0.415.

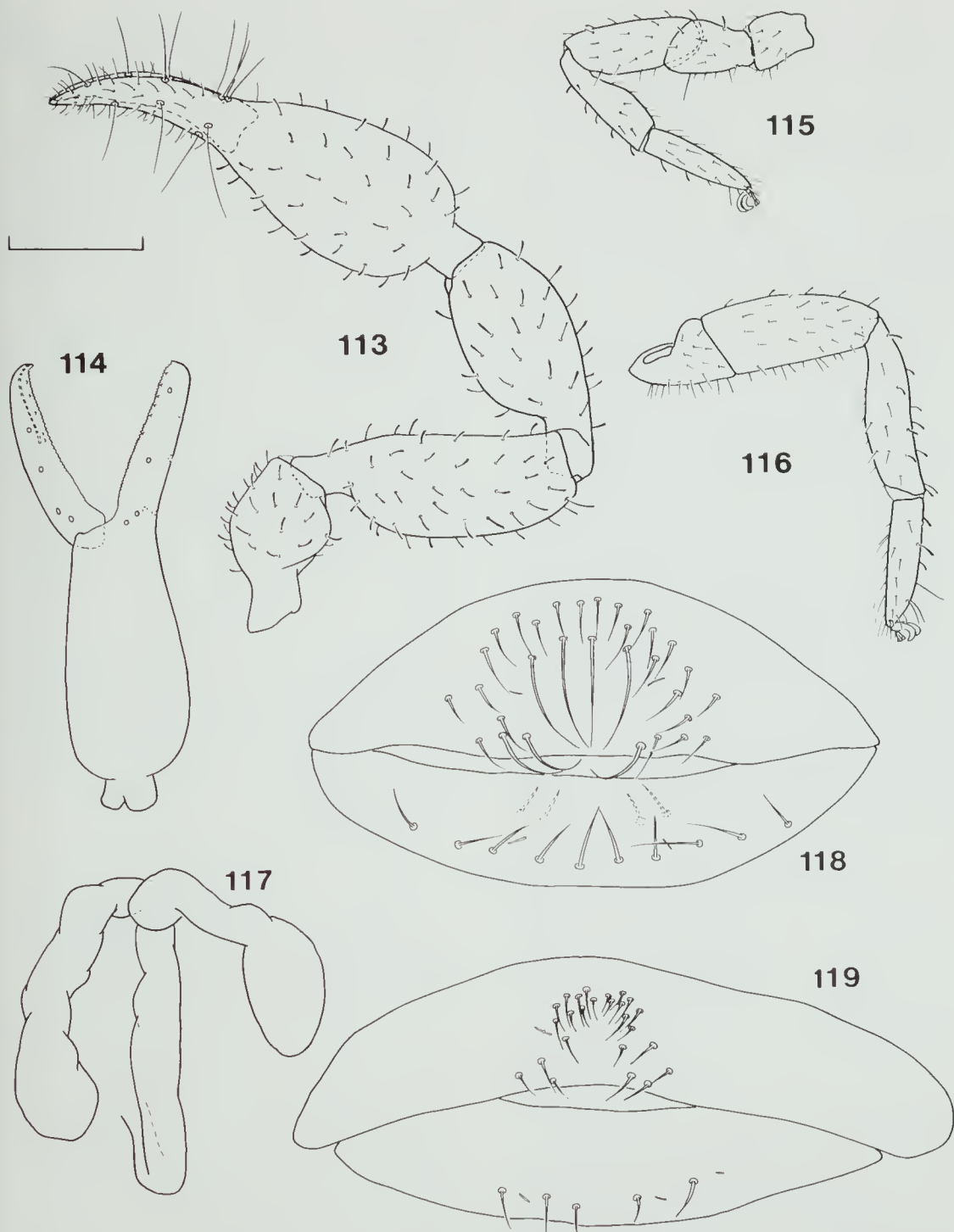
*Haplochernes kraepelini* is known from Java, Krakatau, the Palau Islands and the Caroline Islands in Micronesia.

#### *Allochernes* Beier

#### *Allochernes liwa* sp. nov.

Figures 113-119

*Type material.* Holotype  $\varnothing$ , 7 km W of Liwa, Sumatra, 5°04'S, 104°03'E, 640 m, beating at forest edge, 1 Sep 1984 (M/ZB, 111-7G, MH1810.01, SL).



Figures 113-119. *Allochernes liwa* sp. nov. Figs 113-117, 119, holotype female. Fig. 118, paratype male, MH810.02. Fig. 113, right pedipalp, dorsal. Fig. 114, left chela, lateral. Fig. 115, left leg I. Fig. 116, left leg IV. Fig. 117 Spermathecae. Fig. 118, genital opercula. Fig. 119, genital opercula. Scale line = 0.30 mm (figs 113-116), 0.07 mm (Fig. 117), 0.09 mm (figs 118-119).

Paratypes: 1 ♀, 1 ♂, same data as holotype (♀ in NMV, K744, ♂ in MZB, 111-7G, MH810.02-03, SI.).

*Diagnosis.* Without a complete revision of Asian members of this genus, it is difficult to assess the relationships of this species. It differs from other species of the genus by the shape and size of the pedipalpal segments.

*Description.* Pedipalps deep red-brown, carapace, legs and tergites lighter. Derm of pedipalps, carapace and tergites slightly granulate. Pedipalp (Fig. 113): trochanter 1.60 (♂), 1.58-1.77 (♀), femur strongly pedicellate, 2.52 (♂), 2.74-2.92 (♀), tibia pedicellate 2.19 (♂), 2.27-2.38 (♀), chela (with pedicel) 3.19 (♂), 3.32-3.43 (♀), chela (without pedicel) 2.95 (♂), 3.08-3.17 (♀), hand 1.60 (♂), 1.69-1.71 (♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *ist* slightly anterior to *est*, *ist* slightly closer to *it* than *ist* (Fig. 114). Venom apparatus present in moveable chelal finger terminating in nodus ramosus proximal to *t*. Fixed finger with 37 (♀) marginal teeth, plus 5-6 external and 2 internal accessory teeth; moveable finger with 42 (♀) marginal teeth, plus 3 external and 1 internal accessory teeth. Chelicera with 5 setae on hand, *sbs* and *bs* denticulate, one specimen has an extra seta between *ls* and *sbs* on one chelicera; *ser*-rula exterior of 17-18 (♂), 18-20 (♀) lamellae; flagellum of 3 blades, anterior blade longest and widest, first 2 with spinules on anterior face, last terminally bifid; galea of male simple, of female with 2 distal, 3 medial and 1 basal rami. Carapace with 8 (♂), 9-11 (♀) setae on posterior margin, 1.26 (♂), 1.07-1.08 (♀) times as long as broad; 2 eye spots present, barely discernible; posterior transverse furrow closer to posterior margin of carapace than to anterior furrow. Tergites I-X and sternites IV-X with broad division. Tergal chaetotaxy: ♂, 11: 12: 11: 15: 15: 15: 15: 14: 15: 14: 8: 2; ♀, 14: 13-14: 13: 19-20: 18: 16-18: 18-20: 16-19: 16-18: 14-15: 6: 2. Sternal chaetotaxy: ♂, 33: (3)10 [4] (2): (2)6(2): 16: 19: 18: 16: 17: 14: 8: 2; ♀, 22-25: (2)5(2): (2)4-6(2): 15-17: 23-24: 22-24: 21-22: 20: 15-16: 8-10: 2. Coxal chaetotaxy: ♂, 14: 14: 18: 28; ♀, 14-16: 14-18: 22-23: 42-45 (the latter includes several setae on dorsal edge above pedal foramen). Male genital opercula (Fig. 118) with 2 pairs of long thick setae, remaining setae normal. Female genital opercula (Fig. 119) with mostly short setae. Male genitalia not unusual for family. Female genitalia with long, T-shaped spermathecae (Fig. 117). Legs (Figs 115, 116): monotsarate; femoral junction of legs I and II oblique; subterminal tarsal seta curved simple; all

tarsi with proximal elevated slit sensillum; claws simple; arolium as long as claws; leg IV without tactile setae, although a medium-sized 'pseudotactile' seta is present distally.

Dimensions (mm), ♂ (♀): body length 1.92 (2.65-2.75); pedipalps: trochanter 0.375/0.235 (0.41-0.415/0.235-0.26), femur 0.63/0.25 (0.685-0.73/0.25), tibia 0.58/0.265 (0.625-0.655/0.275), chela (with pedicel) 1.005/0.315 (1.08-1.115/0.325), chela (without pedicel) 0.93 (1.00-1.03), moveable finger length 0.465 (0.475-0.515), hand length 0.505 (0.55-0.555); chelicera 0.235/0.115 (0.26-0.265/0.13-0.135), moveable finger length 0.16 (0.195-0.27); carapace 0.765/0.605 (0.725-0.745/0.68-0.69); leg I: trochanter 0.13/0.11 (0.155-0.16/0.13-0.135), basifemur 0.185/0.135 (0.22-0.28?/0.145), telofemur 0.195/0.11 (0.35-0.355/0.125-0.13), tibia 0.255/0.08 (0.305/0.085-0.08), tarsus 0.265/0.07 (0.285-0.29/0.07); leg IV: trochanter 0.24/0.15 (0.295/0.16-0.175), basifemur 0.23/0.145 (0.255-0.265/0.16), telofemur 0.385/0.155 (0.45-0.46/0.165-0.175), tibia 0.40/0.10 (0.45-0.475/0.10-0.105), tarsus 0.31/0.075 (0.335-0.36/0.08).

*Remarks.* Even though species of the predominately European genus *Allochernes* have been recorded from some of the more northern Asian countries such as Nepal, China and Japan, *A. liwa* is the first species of the genus to be recorded from south-east Asia.

### *Verrucachernes* Chamberlin

#### *Verrucachernes oca* Chamberlin

Figures 120-127

*Verrucachernes oca* Chamberlin, 1947: 313-316, figs 3a-i. — Beier, 1957: 39-40, figs 23a-d. — Beier, 1965: 777. — Beier, 1966a: 147. — Beier, 1970: 324.

*Microchernes orientalis* Beier, 1951: 92-93, fig. 27. — Beier, 1973: 51. Syn. nov.

*Microchernes insularis* Beier, 1953: 84-86, fig. 4. Syn. nov.

*Verrucachernes orientalis*. — Beier, 1957: 40.

*Verrucachernes insularis*. — Beier, 1957: 40.

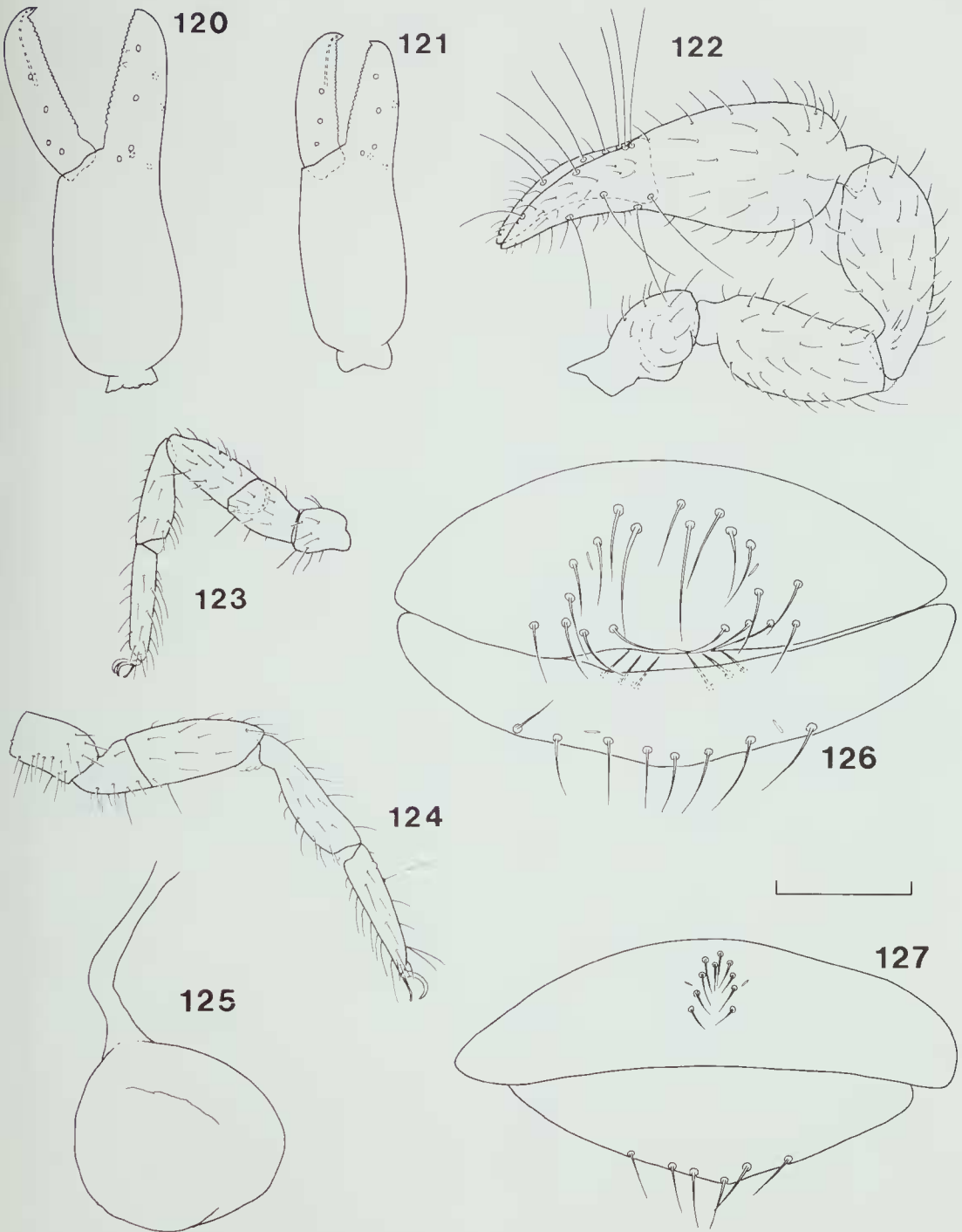
*Type material.* *Verrucachernes oca*: holotype ♀, Oca Point, Guam, 10 Aug 1945, Fritts (JCC?, JC-2067.02001, not examined).

Paratypes: 1 tritonymph, same data as holotype (JCC?, JC-2067.02002, not examined); 1 tritonymph, same data except 11 Sep 1945, G.W. Wharton (JCC?, JC-2067.04001, not examined).

*Microchernes orientalis*: lectotype ♀ (present designation), Hatien [Ha Tien], Vietnam, Mar 1939, C. Dawydoff (NMHW, SP).

Paralectotypes: 1 ♀, 2 ♂, same data as lectotype





Figures 120-127. *Verrucachernes oca* Chamberlin. Figs 120, 122, 124, 125, 127, female, MH829.01. Fig. 121, tritonymph, MH853.25. Figs 123, 126, male, MH866.01. Fig. 120, left chela, lateral. Fig. 121, left chela, lateral. Fig. 122, right pedipalp, dorsal. Fig. 123, left leg I. Fig. 124, left leg IV. Fig. 125, spermathecae. Fig. 126, genital opercula. Fig. 127, genital opercula. Scale line = 0.20 mm (figs 120-124), 0.06 mm (fig. 125), 0.07 mm (figs 126-127).

(NHMW, SP); 1 ♂, Sré Umbell [Sré Ambel], Cambodia [now Kampuchea], Mar 1939, C. Dawydoff (NHMW, SP); 1 ♀, Réam [Phsar Ream], Cambodia [Kampuchea], Apr 1939, C. Dawydoff (MNHN); 1 ♀ (with brood-sac), Plateau Langbiang [Cao Nguyên Lâm Viên], Vietnam, C. Dawydoff (NHMW, SP).

*Microchernes insularis*: lectotype ♀ (present designation), Mau Marru, Sumba, 19 Jul 1949, unter Rinde eines am Boden liegenden Stammes Kleines Waldtal beim Dorf, Buhler and Sutter (NHMB, collection no. 288, SP).

Paralectotypes: 2 ♂, same data as lectotype (NHMB, collection no. 288, SP).

*Other material examined.* Krakatau Islands, Rakata, Zwarte Hoek, 6°09'S, 105°25'E, under bark of logs: 13 Sep 1984, 1 ♂, 3 ♀ (1 with brood-sac) (MZB, 121-O, MH824.01-04, SP); 15 Sep 1984, 2 ♂, 1 ♀ (NMV, 121-A1, MH828.01-03, SI); 15 Sep 1984, 1 ♀ (NMV, 173-1, MH829.01, SI). Sertung, 6°05'S, 105°23'E, under bark of dead *Ficus* sp. on beach, 11 Sep 1984, 10 ♂, 13 ♀ (some with brood-sacs), 1 tritonymph (2 ♂, 2 ♀ in ANIC, 3 ♂, 3 ♀ in NMV, remainder in MZB, 151-R, MH853.02-25, SI, and SP). Panjang, 6°05'S, 105°28'E, under bark of log, 14 Sep 1984, 1 ♂ (MZB, 155-K, MH866.01, SI).

*Diagnosis.* *Verrucachernes oca* differs from the remaining two Asian species of the genus, *V. sublaevis* Beier and *V. montigenus* Beier, in its small size (e.g. the pedipalpal femur of these two species is in excess of 0.50 mm, whereas it is less than 0.43 mm in *V. oca*). It is more similar to the other two species, *V. congicus* Beier from Congo and *V. spinosus* Beier from Ivory Coast, and only a direct comparison of specimens will reveal differences, if they exist.

*Description.* Adults: generally pale brown, with pedipalps and carapace slightly darker. Derm of pedipalps, carapace and tergites coarsely granulate. Pedipalp (Fig. 122): trochanter 1.45-1.81 (♂), 1.59-1.76 (♀), femur pedicellate, 2.41-2.64 (♂), 2.23-2.48 (♀), tibia 2.19-2.48 (♂), 2.25-2.41 (♀), chela (with pedicel) 2.76-3.21 (♂), 2.89-3.15 (♀), chela (without pedicel) 2.77-3.02 (♂), 2.73-2.93 (♀), hand 1.45-1.61 (♂), 1.44-1.70 (♀) times as long as broad. Fixed chelal finger with 8 trichobothria, moveable chelal finger with 4 trichobothria; *eb* and *esh* adjacent, *est* midway between *esh* and *et*, *ist* slightly closer to *it* than to *ish*, *sb* and *b* adjacent, *st* midway between *sb* and *t* (Fig. 120). Venom apparatus present in moveable chelal finger terminating in nodus ramosus near *t*. Fixed finger with 29-33 (♂), 29-34 (♀) marginal teeth, plus 1-2 (♂, ♀) internal accessory teeth; moveable finger with 35-39 (♂), 34-38 (♀) marginal teeth, plus 0-2 (♂, ♀) internal accessory teeth. Chelicera with 5 setae on hand, *bs*, *sbs* and *es* finely denticulate; serrula exterior of 17 (♂), 16-18 (♀) lamellae; flagellum of 3 blades, anterior

blade with spinules on anterior face; distal portion of fixed finger with large subterminal tooth; galea basically as in Chamberlin (1947, fig. 3b), but additional smaller rami may occasionally be present, not sexually dimorphic. Carapace with 8-9 (♂), 8-10 (♀) setae on posterior margin, 1.20-1.31 (♂), 1.19-1.35 (♀) times as long as broad; 2 eye spots present; 2 furrows present, median furrow moderately deep, posterior furrow shallow, closer to posterior margin of carapace than to anterior furrow. Tergites I-X and sternites IV-X divided. Tergal chaetotaxy: ♂, 9-13: 10-11: 10-11: 11-13: 11-13: 11-14: 12-14: 13: 11-13: 10-14: 8-11: 2; ♀, 10-12: 10-12: 10-12: 13-14: 13: 14-15: 14-16: 14-17: 14-16: 13-16: 8: 2. Sternal chaetotaxy: ♂, 14-20: (1)6-9 [4-6] (1): (2)5-8(2): 16-19: 17-20: 16-18: 16-19: 15-21: 12-15: 8-9: 2; ♀, 10-15: (1-2)5-6(1-2): (2)4-7(2): 14-20: 18-23: 17-20: 17-21: 15-21: 14-17: 8-9: 2. Coxal chaetotaxy: ♂, 14-16: 12-19: 15-16: 21-23; ♀, 12-18: 15-20: 15-19: 30-37. Male genital opercula as in Fig. 126. Female genital opercula (Fig. 127): anterior operculum with tight, central cluster of small setae. Male genitalia not unusual for family. Female spermathecae of 1 tubule with very large terminal bulb (Fig. 125). Legs (Figs 123-124): monotarsate; femoral junction of legs I and II oblique; subterminal tarsal seta dentate; leg IV with 1 tactile setae subproximally on tarsus, TS = 0.35-0.43 (♂), 0.32-0.39 (♀); all tarsi with proximal elevated slit sensillum; claws simple, very slender; arolium as long as claws.

Dimensions (mm), ♂ (♀): body length 1.29-1.57 (1.49-1.69); pedipalps: trochanter 0.225-0.265/0.135-0.165 (0.23-0.27/0.23-0.27), femur 0.35-0.43 0.14-0.175 (0.345-0.415/0.145-0.17), tibia 0.38-0.44/0.16-0.19 (0.36-0.435/0.16-0.185), chela (with pedicel) 0.625-0.73/0.20-0.245 (0.62-0.745/0.21-0.245), chela (without pedicel) 0.57-0.685 (0.58-0.685), moveable finger length 0.255-0.32 (0.29-0.325), hand length 0.315-0.395 (0.315-0.40); chelicera 0.18-0.21/0.095-0.085 (0.185-0.205/0.095-0.13), moveable finger length 0.14-0.16 (0.15-0.175); carapace 0.485-0.555/0.38-0.46 (0.47-0.545/0.385-0.455); leg 1: trochanter 0.095-0.11/0.075-0.085 (0.10-0.11/0.075-0.09), basifemur 0.125-0.145/0.085-0.095 (0.125-0.14/0.08-0.125), telofemur 0.175-0.20/0.07-0.085 (0.18-0.20/0.075-0.09), tibia 0.175-0.205/0.055-0.06 (0.17-0.21/0.055-0.06), tarsus 0.195-0.235/0.045-0.05 (0.185-0.215/0.045); leg IV: trochanter 0.15-0.16/0.10-0.11 (0.15-0.185/0.095-0.11), basifemur 0.135-0.155/0.09-0.11 (0.135-0.16/0.09-0.11), telofemur 0.22-0.265/0.10-0.12 (0.22-0.255/0.095-0.115),

tibia 0.24–0.29/0.07–0.085 (0.235–0.295/0.07–0.075), tarsus 0.20–0.255/0.05–0.06 (0.22–0.26/0.05–0.06), distance of tarsal tactile seta from proximal margin 0.08–0.095 (0.07–0.10).

Tritonymph: colour paler than adults. Pedipalp: trochanter 1.65, femur 2.40, tibia 2.22, chela (with pedicel) 3.03, chela (without pedicel) 2.86, hand 1.51 times as long as broad. Fixed chelal finger with 7 trichobothria, moveable chelal finger with 3 trichobothria; *ist* and *sb* absent (Fig. 121). Serrula exterior of chelicera with 16 lamellae; galea as in adults. Carapace with 9 setae on posterior margin; 1.22 times as long as broad. Tergal chaetotaxy: 9: 7: 9: 10: 12: 10: 12: 11: 11: 8: 10: 2. Sternal chaetotaxy: 4: (1)4(1): (2)6(2): 15: 14: 13: 14: 15: 13: 7: 2. Coxal chaetotaxy: 8: 8: 9: 12. Monotarsate.

Dimensions (mm): body length 1.14; pedipalps: trochanter 0.19/0.115, femur 0.30/0.125, tibia 0.30/0.135, chela (with pedicel) 0.53/0.175, chela (without pedicel) 0.50, moveable finger length 0.235, hand length 0.265; carapace 0.44/0.36.

*Remarks.* There is significant variation in characters that Beier (1951, 1953, 1957) considered were important delineators at the specific level within the genus *Verrucachernes*. These include the number of internal accessory teeth on the chelal fingers. Examination of the Krakatau material reveals that it varies from possessing two teeth to completely lacking teeth, and indicates that this character must be discarded. Beier (1957) also placed great reliance on the number of blades in the cheliceral serrula exterior, but due to a certain amount of variation it too is discarded. Differences in surface sculpturing were cited as a specific character of *Microchernes orientalis*, but comparison of the types of this species and all of the other material at hand reveals that it does not differ at all. Thus, with all of these characters discarded and the lack of consistent differences in the size and shape of the pedipalpal segments leads me to synonymise *M. orientalis* and *M. insularis* with *V. oca*.

In the original description of *M. insularis*, Beier (1951) indicated the presence of two males and two females in the type series. However, only three specimens are present in the Basel collection, and the fourth specimen is not present in NHMW (Dr J. Gruber, pers. comm.). The alternative spelling of the localities of *M. orientalis* given in square brackets are modern spellings advocated by the US Board on Geographic Names and follows Harvey (1985).

*Verrucachernes oca* is widely distributed in the Oriental region from Vietnam to the Solomon

Islands.

### Smeringochernes Beier

#### Smeringochernes sp.

*Material examined.* Java. Ujung Kulon, Pulau Peucang, 6°45'S, 105°15'E, beating, 11 Sep 1985, 1 tritonymph (MZB, 62-16A, MH611.01, SL).

*Remarks.* Without adult material the identification of this species cannot be confirmed.

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